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EDITOR OF THE MONTH

RICHARD KOVACS, M.D.
New York, N. Y.

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²

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⁴

⁵ High school graduates admitted to four-year course leading to degree from Tufts College. Tuition for degree course is \$400 per year. College graduates admitted to twelve-month certificate course.

⁶ Effective 1947 class.

⁷ Effective 1948 class.

⁸ Reprinted in part J. A. M. A. 130:1156 (April 20) 1946.

⁹ At the end of nine months the students can register in the graduate school for a degree of master of science in Physical Therapy.

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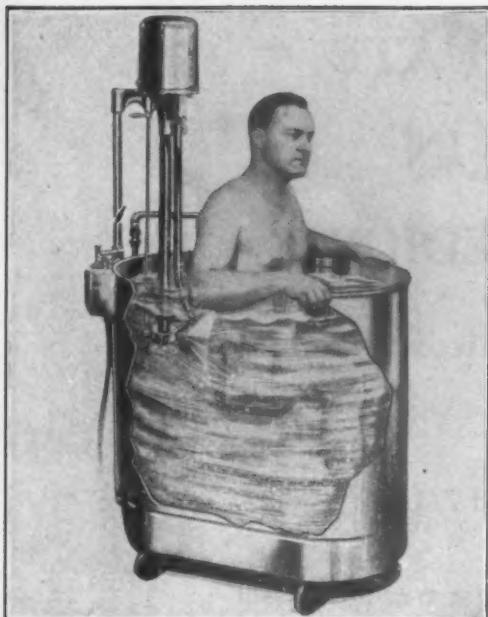
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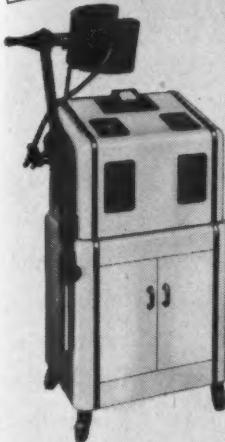
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INTRODUCTION

THE RT. HON. THE LORD HORDER, G. C. V. O., M.D., B. Sc., F.R.C.P., M.R.C.S.

Physician in Ordinary to H. M. the King;
Consulting Physician to St. Bartholomew's Hospital, London;
President of the British Association of Physical Medicine.

LONDON

No more welcome gesture of Anglo-American colleagueship could have been made than the invitation sent by the President of the American Congress of Physical Medicine to British physicians and surgeons to contribute a series of articles to the *ARCHIVES OF PHYSICAL MEDICINE*. The invitation gives a very practical confirmation of the good will which Dr. Kovács has shown toward the exponents of physical medicine in Great Britain and the enthusiasm with which he greeted, on behalf of his coworkers in America, the formation of the British Association of Physical Medicine two years ago. With two exceptions, all the writers of the papers in the present symposium are members of the Council of that Association.

A number of factors tend to emphasize the present interest in physical medicine—that is if, as I think we ought, we read the connotation of the term in its widest sense. The war made it imperative that as many citizens as possible should be as physically fit as possible; hence physical development became a primary consideration in relation to the fighting services. The Disabled Persons (Employment) Act (1943) gave the Ministry of Labor in Great Britain the power to set up rehabilitation centers, and it also made it incumbent upon industry to absorb a quota of disabled pensioners. In Great Britain, again, the work of the Empire Rheumatism Council resulted in the setting up of a subcommittee of the Minister of Health's Advisory Committee, and this subcommittee made recommendations for a national scheme of research into, and treatment of, chronic rheumatic disease. To all this we may add the rapid growth of physical therapy as a science and an art—the growth of auxiliary bodies such as the Chartered Society of Physiotherapists, with a present personnel of over 14,000 women and men, and the growth of instruments and methods in ray therapy.

In view of all this, the liaison between our American Colleagues and ourselves is both opportune and helpful, and I greatly appreciate the honor of introducing these articles by my friends and colleagues.

HORDER.

MANIPULATION

SIR MORTON SMART, K.C.V.O., D.S.O., M.D.

Manipulative Surgeon to His Majesty The King;

Consultant in Physical Medicine to the R.A.F.

LONDON

The general principles of manipulative surgery have been known and recognized since the early days of organized medicine, and when they are applied in the right type of case the beneficial effect in view may be expected with certainty.

Until comparatively recently, however, this valuable therapeutic method has been somewhat neglected by the medical profession, mainly because of the doctrines of rest, which for so long has been considered essential for the repair of tissues in a state of inflammation, particularly in connection with joints. This doctrine has been helped by the patient, because on account of pain the average patient has been satisfied to have an injured joint kept at rest; consequently the disastrous effects of the formation of adhesions leading to limitation of the range of normal joint movements is a common result of even minor joint injuries.

Unfortunately, prejudice still exists, and those whose work today lies in the field of manipulative surgery realize that there are many joints partially or permanently crippled by adhesions which could be cured or alleviated by skilled manipulative treatment.

Manipulative surgery may be defined as the art of manually moving a joint throughout its full range of movements in all directions with the designed object of overcoming a resistance to its normal movements arising from certain pathologic causes. To diagnose the state of a joint which would benefit from manipulation and to carry out the manipulation successfully, it is necessary to have a sound knowledge of the anatomy, physiology and pathology of joint structures, a knowledge of the normal range of movement of all joints and a capacity to diagnose as accurately as possible the probable pathologic causes which are interfering with the normal range of joint movements. By constant practice in handling joints in health and disease, an acuity of touch can be developed which is essential to success in manipulative surgery.

Manipulation of joints should follow a well considered plan, and it is based on gentle handling of joint structures and is in no sense a question of brute force.

Joints are composed of various complicated and delicate structures, each one of which has an important part to play during movements, and the various special movements for which a joint is designed are normally performed painlessly and with the least amount of friction. The type of case most amenable to treatment by manipulation is that in which the main pathologic cause is interference to joint movements by the presence of adhesions. It must be emphasized that in all joint movements the aerolar tissue plays a more important part than is generally considered. This tissue forms a supporting bed between the muscles, blood vessels, nerves and all deep-seated structures and in so doing fills up the crevices and spaces around a joint and acts as padding and an investing sheath to many structures.

In all joints it is essential to have free movement of one part over another, and, as the range of these movements varies in individual joints, the

fibers of the areolar tissue are specially arranged to accomplish this. In addition, the tissue contains a small quantity of translucent lymphlike fluid which keeps it moist and thus gives to it the necessary flexibility and suppleness to enable the joint to move with the minimum of friction. Trauma or disease may lead to the loss of function of a joint in varying degrees. The common results are stiffness, atony and wasting of muscles and limitation of movement by adhesions, and all these results are the sequel to the changes in living vascular tissue reacting to some form of irritation ending in the formation of an inflammatory exudate. This exudate spreads into the tissue spaces in amounts varying according to the severity of the injury, and the distance to which it may penetrate depends on the looseness of the texture of the affected tissue. In comparatively loose tissue, such as muscle, considerable separation of the muscle fibers results, and when the exudate collects within the inextensible sheaths the pressure effects on the fibers cause tension and produce pain and loss of function.

This interstitial pressure in joint structures interferes with nutrition and stretches the areolar tissue producing stiffness owing to loss of the flexibility and suppleness of the tissue. The penetration into the tissues of the fluid and solid constituents of the blood following injury acts on the various tissue elements pathologically by increased tissue growth and loss of flexibility of the areolar tissue and by the formation of adhesions if the exudate becomes organized into fibrous tissue; it acts mechanically by pressure on or stretching of the cellular elements and their supporting framework and by the binding effects of adhesions.

As inflammation is a process leading to repair of damaged tissue, the beneficial effects can follow only if the processes of inflammation necessary for repair are carried to a successful issue, and those results depend on the completeness of absorption of the effusion into the tissues. If these processes are prolonged and particularly if the part is kept unduly at rest, the general effect on the muscles is that they lose their tonicity, irritability, elasticity and contractility followed by atrophy with loss of function to all degrees. In this condition the muscles become relaxed and their tendons are at an operating disadvantage mechanically so that their effective pull on their points of attachment is diminished and seriously interferes with efficient joint movement. In addition joint structures such as ligaments and capsules become stretched and loose in their texture and so diminish their passive supporting qualities.

If recovery is delayed the next stage leads to the formation of adhesions the severity of which depends chiefly on the vascularity of the tissues, but the process of the formation of adhesions is essentially the same for all structures.

The main effect of adhesions is limitation of movements of all degrees, and the seriousness of the limitation depends on the time that the inflammatory processes have existed. Under favorable conditions adhesions may form rapidly, but in the early stages they may easily be drawn asunder by gentle manipulation with only slight subcutaneous damage; but when the newly formed tissue ultimately becomes fibrosed, adhesions may so powerfully bind structures of all kinds together that when they are successfully separated by manipulation an internal wound is produced. In addition to the mechanical binding of parts, together the constant irritation set up by attempted movements adds to the disability of the joint because it leads inevitably to pain, loss of function and chronic synovial inflammation with a collection of fluid in the joint sac and protective muscle spasm.

The formation of adhesions is further stimulated by pain because it encourages the painful parts to be kept at rest, and opposing inflamed surfaces

are thus kept in contact while the exudate passes through various processes leading to organization.

Where a joint has a wide range of movement there is usually a loose capsule, and between the capsule folds is a favorite site for adhesions when the capsule is bathed in reparative fluid and kept at rest. Movements tending to open such an adherent capsule cause pain, which, in turn, further limits movements. Joint adhesions may be intra-articular or extra-articular, and both may be present in the same joint.

In all joints limited by adhesions for any period limitation is always accompanied with atonicity of muscles, which is rapidly followed by wasting, and in joints exhibiting considerable pain there is also muscle spasm, which still further prevents joint movement. It should be noted, therefore, that for a joint to move comfortably and easily through its full range, every structure designed for movement must be capable of free and painless movement on every other structure to which it is adjacent. Extra-articular adhesions occur in the muscles and their sheaths, tendons and fasciae and in the fatty pads filling spaces around joints and particularly in the delicate areolar tissue, filling up all the many spaces between and in the different structures of a joint.

In the examination of stiff joints one should consider: (1) the normal range of the corresponding joint; (2) whether any restriction of movement was noticed in the faulty joint before the onset of the disability under examination, and (3) points tender to slight and to deep pressure, with particular attention to painful regions when touched or moved or when at rest.

After this preliminary examination the joint should be gently but firmly put through the fullest range of its movements in each direction and an estimate made of the degree of its restriction. Adhesions may be safely presumed to be present if when the points of restriction are reached pain is produced by attempting to force the movement beyond each point of limitation and if increase in the range of movement is muscularly resisted.

In investigating for the presence of adhesions it should be remembered that ligaments limit the movement of a joint so that considerable tension can be applied to them when a normal joint is being stretched to its full extent. At the same time a normal ligament when stretched beyond a certain point sets up a reflex muscular contraction to protect itself. The normal restriction caused by a ligament at full stretch must, therefore, be differentiated from that caused by adhesions, particularly when one is manipulating a joint under anesthesia, during which the protective muscular contraction is abolished.

When adhesions restrict a joint movement only in the last few degrees, it is not always easy to decide whether the limitation is due to adhesions or to the normal ligamentous restriction. This can be learned by experience in handling joints, because adhesions when stretched to the point at which they resist have a characteristic "springy feel" which can be recognized.

Muscle spasm or adaptive shortening of muscles also give a characteristic "springy feel," but a differentiation may be made by digital pressure over the muscle tendon, which may be felt to be slack or in a state of tension when the movement of stretching is performed.

No sudden or unexpected movement or sudden alteration of direction of movement should take place in the examination of joints, whether healthy, injured or diseased. The movements should be thoroughly and determinedly carried out, all jerky movements being avoided, and conducted with progressive increasing power till the extent of their range has been reached. The object should be to put the joint through the widest range of movement

in all directions of which it is capable without the assistance or resistance of muscles which act on it.

When it has been decided that adhesions are present, a decision has to be made whether it is necessary to manipulate under an anesthetic with a view to separating adhesions rapidly or whether the adhesions are capable of being separated by less drastic combined methods of carefully designed active and passive movements and treatment of the muscles by graduated contractions. The decision is not always an easy one and can be made only after the joint has been examined and every detail of the case carefully studied.

Manipulation of joints should never be undertaken in a haphazard way. The primary object of manipulating joints with adhesions is to free the adhesions, and in doing so a subcutaneous aseptic wound with the development of edema and all the sequelae of inflammation is caused. When this fact is borne in mind, it is obvious that adhesions would form again unless the manipulation is immediately followed by treatment that will ensure as completely and as rapidly as possible absorption of lymph, increase of the local arterial, venous and lymph circulations and restoration of tissue nutrition as completely as possible. Above all, the inflamed parts must be kept moving in relation to each other, gently at first and gradually increasing in extent and range, so as to prevent the further development of adhesions, which would certainly follow if the parts were kept at rest.

It will thus be seen that manipulation is only a necessary preliminary to other treatment and that it is by a combination of manipulation and well designed after-treatment based on physiologic and pathologic principles that the looked-for end results can be achieved.

It is important, also, to remember that when as the result of manipulation under an anesthetic some adhesions are stretched but not completely ruptured, either because the movements during manipulation were unintentionally or by design incomplete or because the natural limit of the joint was reached before the adhesions were sufficiently stretched to make them give way, the outlook is not so favorable for an immediate result as when adhesions are felt to give way and the range of joint movement immediately increased. Stretching adhesions without rupture is usually followed by severe pain, and if the pain persists it is generally advisable to perform a second manipulation soon.

Manipulation of joints bears the risk of doing damage beyond the effect originally intended. The main danger is that of using too much force and so pushing the joint beyond its full range, causing a ligamentous tear, fracture or dislocation.

The chief contraindication to manipulation of joints is tuberculous disease. Other main contraindications are active infective processes, bone overgrowth from any cause, such as after fractures, myositis ossificans, bone cysts, bone tumors and in certain conditions of advanced osteoarthritis. When roentgenograms show considerable translucency of bone structure from disuse or other cause, great caution is required in handling such joints. Chronic infective arthritic joints should as a general rule not be manipulated, particularly if roentgenograms demonstrate erosion of cartilage.

Summary

To sum up, manipulation is a method of treatment employed in association with other treatment or as a preliminary to other treatment and deals with local conditions of joints and muscles, including conditions involving impairment of mobility and displacement of structures. It requires a sound knowledge of medical science and the experience founded on it, and

it is unscientific to apply manipulative treatment indiscriminately and without knowledge of the underlying condition.

From a long experience of manipulating joints, my conclusion is that if adhesions are successfully freed and if this procedure is immediately followed by passive coaxing of the joint through its full range of movements in all directions and by treating all the muscles of the joint efficiently by graduated muscular contractions, the end result in every correctly selected case will be complete restoration of function, as regards both range of movements without pain and muscular power.

PHYSICAL MEDICINE IN THE TREATMENT OF RHEUMATIC DISORDERS

An Impression from the War Years

FRANCIS BACH, M.A., D.M., D. PHYS. MED.

Consultant in Physical Medicine, Emergency Medical Service;
Consultant in Rheumatic Diseases, London County Council Hospitals

LONDON

With the introduction of the Emergency Medical Service in 1939 came the development of a new hospital system. Many institutions which cared for the mentally and the chronically sick were taken over and enlarged to become general hospitals for the treatment of the acutely sick and of service and civilian casualties. The administration hardly realized the important part that physical medicine would play before the end of the war; small, poorly staffed and poorly equipped departments grew into rehabilitation centers with physical medicine specialists, physical therapists, occupational therapy departments, physical instructors, army educational officers and Ministry of Labor officials whose duties included the retraining and resettlement of service and civilian war workers. The Army, Royal Air Force and Royal Navy were developing methods of raising the physical and educational standards of their recruits, and the hospital treatment of many of their sick and wounded was carried out in the hospitals of the Emergency Medical Service.

It was my privilege to be responsible for the creation and running of the departments in one of its ten sectors. In these hospitals were patients with all forms of rheumatism: the young service man with rheumatic carditis, acute infective arthritis, and various forms of generalized nonarticular rheumatism attributed to anxiety states, nutritional and occupational disturbances and localized backache associated with occupational strains and lesions of the intervertebral disks; the bombed-out young mother with the emotional and physical signs of early rheumatoid arthritis, and the elderly cripple with arthritis evacuated from the London County Council hospitals, all had to receive treatment in the physical medicine departments of these hospitals.

In the year preceding the outbreak of the war I analyzed the records of some 200 consecutive patients referred to me at a rheumatic clinic held in a general hospital. When the cases were classified under the four main groups of the classification drawn up by the Royal College of Physicians committee, it was found that juvenile rheumatism accounted for 2 per cent, the rheumatoid type of arthritis (including ankylosing spondylitis) for 8 per cent and the osteoarthritic type for 8 per cent; in 2 cases of the last-named type gout was a recognized etiologic factor. Nonarticular rheumatism accounted for

72 per cent of the cases and conditions wrongly diagnosed as rheumatism for 4 per cent; these included pulmonary tuberculosis with tuberculous disease of the dorsal vertebrae, osteomyelitis, neoplasm with secondary deposits in bone and nontropical sprue. It is my clinical impression that during the war years fewer cases of gout were observed but that there were many more cases of gonorrhreal rheumatism, ankylosing spondylitis in its early stages, rheumatoid arthritis and nonarticular rheumatism associated with anxiety states and nutritional deficiencies. Our work during these years showed my colleagues and me that the dramatic new discoveries in the field of bacteriology, such as penicillin and the sulfonamides, were of little or no help in the treatment of our rheumatic patients, except those with gonorrhreal rheumatism. We learned that to be successful treatment must be based on a careful study of the patient, his constitution, his family and his work, and we also learned how necessary it was to treat each of these factors. Most of the London children had been evacuated, and we observed little juvenile rheumatism among the adolescents and young adults who came under our care.

Rheumatoid Arthritis

Rheumatoid arthritis usually manifests itself in persons of a particular constitution: the asthenic type with certain recognizable physical and non-gonadal sexual characteristics. Our patients conformed to this pattern; they were "worriers," often overconscientious, tense persons. The soldier who gave a history that his knee or his wrist had become swollen a week after evacuation from the beaches of Dunkirk and the young mother who presented the classic picture, with vasomotor disturbances and swelling and lateral tenderness of the proximal interphalangeal joints of the hands, presented this constitutional picture. Worry, bombing, bereavement, a wrecked home and financial loss were common "trigger" factors. Although the mechanism of the cortical regulations of autonomic function is not as yet known, it is generally recognized that worry or fright may be followed by general vasomotor constriction. The cerebral cortex, the hypothalamus, the autonomic nervous system and the endocrine glands form at least a part of the pathway. Prolonged worry prior to the onset of arthritis stood out as a common and constant factor in the domestic situations of these patients. In a series of 50 cases which I investigated in London during the war years, when the onset of arthritis was sudden, the bombing appeared to play an important role. A land mine on her home, the shock of giving birth to a child with harelip and the loss of her husband were the "trigger" factors for 3 of the women. For patients in whom the onset of arthritis was gradual, some of whom were men, financial anxiety, long hours of work, unskilled help in the business and inadequate diet—due in part to the fact that their wife had been evacuated with the children—were factors which were commonly noted. In no instance did acute or "focal" infection appear to play a role.

In the management of these patients the almoner dealt with the social background; she helped to adjust the home conditions by finding other accommodations when the home had been blitzed, by evacuating the children to suitable billets in the country, by arranging financial aid through public assistance and the Hospital Samaritan fund and by enlisting the help of the Women's Voluntary Service to take the children to the hospital by car or ambulance. Only then would the patient be admitted to a hospital in London or on the Sector and given psychologic and physical rest; drugs to relieve pain and muscle spasm and to promote sleep, correct anemia and stimulate the reticuloendothelial system, and a diet of small bulk and high caloric value and balanced to correct vitamin deficiencies, prepared so as to be appetizing. Physical treatment included relaxation and breathing exercises, application of slings, springs and pulleys, ultraviolet rays and short wave radiation and

provision of foot supports, corsets and plaster and plastic splints; remedial occupational therapy and general advice on the course of disease, measures to be taken to modify it and where to get treatment on discharge from the hospital was given. The "follow-up" included a close personal contact with the patient's relatives, his employer and the labor exchange, including the factory medical service. Convalescent treatment was difficult to carry out. Most of the spas had been taken over for evacuated Government officials, but I sent many patients in the early stages to Roffey Park and many with severe ankylosing spondylitis to St. Loyes College at Exeter for vocational training. There they learned to become skilled, well paid craftsmen in precision instrument work.

Ankylosing spondylitis was common among the young men and women in all three services, and I recognized the condition in at least 50 (fifty) young servicemen complaining of backache or sciatica. Usually the patients were virile, athletic young men of asthenic constitution; they complained of pains in the upper part of the back, low girdle pains, sciatica or low back pain and stiffness. Occasionally symptoms appeared to follow a minor injury to the back; usually the onset was insidious. Roentgenograms showed the characteristic changes of this disorder in the sacroiliac joints, with osteoporosis in the regions of the epiphyses and deposition of calcium around the joints. The sedimentation rate of the blood was raised, and in some cases there was an elevation of alkaline phosphatase in the blood plasma. There was no clinical evidence that focal infection played a major role, and I felt that endocrine distribution was probably the main causative factor.

Recently Buckley has emphasized the responsibility of the prostate gland in this disorder. We found that treatment with roentgen rays, combined with postural and breathing exercises on slings of the Guthrie Smith type, were the best method of treatment, followed in selected cases by a course of hydrotherapy at a spa. The majority of these men are now being followed up under the Ministry of Pensions scheme, and, although they have to come from time to time for further roentgen ray or physical treatment, they are in full time civilian employment.

There is a close interrelationship between fatigue and rheumatism. In recent years there has been a mistaken view of rest as a therapeutic agent, due in part to failure to recognize the difference between complete immobilization of the patient and avoidance of fatigue. In the war years there were three conditions in which I learned to appreciate the importance and value of rest. Young women and middle-aged and elderly women, unused to household work or other forms of manual labor, were obliged, under wartime conditions, to undertake the entire work of their homes, with all that it involved in the preparing of meals, cleaning, carrying of heavy shopping baskets, standing in queues and caring for young children, and often, in addition, part time work in one of the war industries. They complained of the gradual onset of numbness, tingling and uselessness of the hands and fingers; these symptoms, often associated with severe pain and disability, were worse when the patient awakened in the morning. On clinical examination one noted the general signs of chronic fatigue with atonic musculature and sagging of the shoulder girdles—so that the line of the clavicle was almost horizontal—tenderness of the extensor muscles of the forearm and flexion deformity of the fingers. Walshe has described this picture as the "rib pressure syndrome," the incidence of these acroparesthesias being related to an anatomic factor, the flow of blood through the subclavian artery and the elements of the brachial plexus being caught between the arms of a vise formed by the clavicle and the vein of the thoracic inlet. Humphrey considers that the condition is associated with continued and heavy use of the hands and arms, unrelaxed gripping being the movement common to all. The pain in the

palms is usually due to spasm in the lumbrical muscles through too much flexion of the metacarpophalangeal joints, leading to wrong use of the muscles of the forearm; there is pain down the back of the forearm and tenderness over the head of the radius, presenting the picture of "tennis elbow." More work is thrown on the shoulder muscles, and contractions appear in the region of the internal rotator and pectoral muscles. Humphrey considers that the paresthesias are due to spasm of the flexor muscles from overuse and of the extensors from overstretching, interfering with the circulation.

Whichever view was taken of the mechanism, treatment had to start with a cessation of manual work. In severe cases an initial period of a week in bed with the arms in slings, followed by postural exercises and strengthening of the shoulder muscles, had to be given. The strength and balance of the opposing groups of muscles of the fingers had to be restored, and they had to be reeducated to do their own work. Deep transverse friction was given to the muscles of the hands and, in particular, to the origins of the extensor muscles of the forearm. Unnecessary gripping of the hands had to be avoided for many weeks. Treatment with such physical measures as radiant heat, diathermy and ion transfer was always unsuccessful.

We treated many patients with lumbago and sciatica, thought to be due often to an intervertebral lesion and sometimes to a ligamentous strain or partial rupture. We found it hard to differentiate these conditions, but rest in plaster was usually followed by relief from symptoms. Early in the war the more active methods of diathermy, deep massage, exercises for the back and strenuous class exercises with the army physical instructor, although sometimes spectacularly successful, frequently resulted in the aggravation and prolongation of symptoms and disability.

In middle-aged patients at about the time of the menopause we found instances of backache associated with spinal osteoporosis; these were also associated dietary deficiencies, especially of vitamin C, and endocrine disturbances. In one case there were multiple small fractures in the pelvic bone, such as have been described by Milkman and, recently, by Fran^çhon, in Paris.

Many persons with stiff and painful shoulders were referred to our departments. In service patients the condition was usually diagnosed as being due to strain of the supraspinatus muscles, rupture of the "rotator cuff" or subacromial bursitis. There was response to rest, preferably on an abduction splint, injection of procaine hydrochloride or roentgen irradiation, followed by active movements on slings to overcome adduction and internal rotation contraction and to secure a full range of active movement. The return of power and coordination was obtained by active exercises, games and occupational therapy. Many elderly civilians complained of pain and limitation of motion of the right and then of the left shoulder. Although occupational strain and possibly partial rupture of the inner fibers of the supraspinatus tendon may have been the immediate cause in some instances, I felt that psychologic fatigue was the main factor. Rest, sedatives and endocrine therapy, followed by gentle passive and then active shoulder movements, proved to be the most successful method of treatment. Strong passive manipulations were always unsuccessful.

In general, during the war years some of us learned the help that the physical medicine team—the physical therapist, the sergeant instructor and the occupational therapist—could give to the patient with certain forms of articular and nonarticular rheumatism in his active re-abling. Also we were made to realize the importance of physical and psychologic fatigue in the causation of other forms of rheumatism, such as rheumatoid arthritis and the stiff shoulder, and we learned again the importance and value of rest in their treatment.

MEDICAL ASPECTS OF REHABILITATION

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A great deal has been said and written during the last few years regarding the whole subject of rehabilitation, but in the past emphasis has been placed on the surgical rather than the medical aspects of the matter. To retrain an individual in the full use of a fractured limb is an important but relatively simple process, whereas medical and psychiatric cases involve a more complex problem and necessitate a broader approach by all concerned, in which social and occupational features are of equal importance with strictly medical aspects.

In addition, the problem is intimately associated with the economic situation of the country. During the interwar period there was an average number of two million persons unemployed, and in general the tendency was for the less healthy and efficient to lose their jobs; in such instances the return to full employment was often very difficult.

From the time of Dunkirk onward the question of man power has been of paramount importance, and the country has been faced with a serious deficiency; there is no longer a labor surplus. The outlook in the coming years is uncertain, but a shortage of skilled artisans for some years is expected.

Against this background the Disabled Persons (Employment) Act (1943) has been passed and is a landmark in social medicine. Under the Act, the Ministry of Labor has power to establish industrial rehabilitation centers and to insist upon all employers receiving their full quota of disability pensioners. The state now accepts an obligation towards the individual who is suffering from any type of disability: an obligation to recondition him as far as possible; to train him for a new occupation; whenever necessary, to care for his family during his period of training, and to resettle him in suitable employment.

A similar attempt was made after the last war, with the establishment of the King's Roll, which was essentially a voluntary effort. Good employers were cooperative, but less conscientious ones did not always play their part. Once the postwar hero worship phase had passed over, many partially disabled men found themselves unwanted and unemployed. This can no longer happen today under the present Act, and there is a very different attitude to be found on all sides.

Rehabilitation, as understood today, is a form of scientific therapy which should be a part of the skilled medical treatment of all illnesses, whether the patients are dealt with in the hospital or in the home. The better the treatment and the earlier the application of rehabilitation, the fewer will be the persons with permanent disability who will require vocational training and the better the results in those so trained.

During the war there were, of necessity, much bigger developments in the forces than in civil life, but the discrepancy is rapidly becoming less marked. In the fighting services—notably the Royal Air Force—well organized centers were set up in which treatment, physical training and readjustment to flying or ground duty were carried out simultaneously. During the last two years the Ministry of Health have built, equipped and staffed a rehabilitation department at each emergency hospital, to which orthopedic patients and those needing long-term care of fractures can be transferred.

Medical Development

Thus far rehabilitation has been confined mostly to surgical conditions, but developments on the medical side are rapidly catching up. The Ministry of Health has made a survey of all the large hospitals in the country, equipment and help being provided as required; at the same time, the range of rehabilitation is beginning to cover general medical and psychologic disorders.

A good start has been made, but a great deal of work remains to be done. In particular, there is a need for detailed knowledge of the special type of physical and mental strain involved in each process of industry, before one can settle men intelligently into new jobs. The working out of satisfactory methods of resettlement will depend upon extensive research, both in the factories and in the hospitals, with a steady interchange of knowledge between those who look at the problem from the theoretic and from the practical point of view.

Recent Developments

In order to deal with some of these problems, the first and "working model" rehabilitation center has been established at Roffey Park, Horsham, under the chairmanship of Lord Horder, thanks to the generosity of a number of the leading employers in the country. The center provides residential facilities for 120 patients of both sexes, aged between 18 and 50 years. Priority is given to employees of subscribing firms, but admission is not limited to patients from these sources. Patients are sent also by local authorities and by voluntary hospitals.

On admission, each patient is given a thorough examination and a psychiatric interview; intelligence is tested by means of Raven's Matrix, which is used throughout the army. Raven's Matrix is a performance test of intelligence, compiled by Dr. Raven and demanding the solution of problems based on a series of standard diagrams. The test is a valuable guide to the level of adult intelligence. It can be given to groups or to individuals, but in certain of the former instances there may be bizarre scoring, resulting in the necessity for the retesting of individual members. The patient is also interviewed by the social worker, who has had wide industrial experience.

When all the information so collected has been integrated, an appropriate regimen is drawn up for each patient; although this individualistic approach is rather time consuming, it is essential if satisfactory results are to be obtained. By general consent the time is past when an institution can merely record so many cases of duodenal ulcer or rheumatic carditis without reference to the personality or background of the patient.

If necessary, roentgenograms are taken and pathologic investigations are carried out, but many of the cases have been exhaustively investigated in general hospitals before admission. All patients are given forty-eight hours of complete rest while the examinations are being undertaken and then organized treatment is begun.

Methods of Treatment. — At Roffey Park, emphasis is placed on all-around treatment of each patient with physical, occupational and psychologic features all receiving their due amount of attention. In order to attain this end, the patients' day is mapped out and appropriate occupations are provided. For men these consist of work in the engineering workshops, wood-working and wood-sawing and gardening. Each patient is encouraged to choose the kind of occupation in which he is most interested, and, once the choice has been made, changing to another occupation is discouraged.

This form of training is carried out under the supervision of a competent staff, who are provided by the physician with the requisite information about

each patient. This method enables the individual approach, to which reference has already been made, to be maintained.

Occupation for women consists of domestic work, needlework classes, gardening; assisting in a day nursery and training in elementary dietetics. Here, again, the same procedure exists, and the various kinds of occupation have been chosen not only for their inherent interest but as a contribution to citizenship.

Unless there are definite medical contraindications, every patient carries out a graded course of physical training each day; the training takes place in classes, whenever possible in the open air. The work is made extremely interesting, and no difficulty is found in securing the full cooperation of all patients. On the men's side, active exercises are encouraged, whereas for the women more rhythmic work, much of it done to music, is found to be most beneficial.

Attention to Diet. — Special attention is paid at Roffey Park to the question of diet. All the cooking is under the supervision of a dietitian, and the kitchens have been laid out so as to secure efficiency combined with optimal conditions for cooking. All vegetables and salads are grown in the gardens and are thus served fresh, and it is significant how appreciative the patients are of both salads and fruit. In addition, the patients are encouraged to help in the preparation of some of the dishes; this is made an opportunity for instruction in elementary dietetics.

Medical Treatment. — Each patient is seen by the physician in charge at least twice a week and oftener if necessary. During these interviews the various problems in the patient's life are discussed and help is given toward eradicating them. In some instances difficulties have arisen at work; in others, at home, while in others, again, the problems are of a more deep-seated nature. In every case a full understanding of the patient's working background is essential, and, in order to maintain this, close contact is kept with the offices and factories from which patients have been sent. Drug treatment is provided when necessary, but, in general, reliance is placed on improvement of the general physique of the patient and on helping him to adjust himself to his problems rather than on a multiplicity of medicants.

Entertainments and Evening Activities. — Each evening some form of communal activity is arranged for the patients, including discussion groups, gramophone recitals, amateur theatricals, cinema shows and dances. Attendance at these entertainments is voluntary, and facilities are available elsewhere in the house for those who prefer to read or play cards or to occupy themselves in some other individual way. In general, it is found that the group activities have a valuable socializing influence, and they, too, are designed so as to make patients better citizens. Thus, in the discussion groups special attention is drawn to consideration of the various White Papers at present under discussion in Parliament, and in the gramophone recitals the patients are introduced, many of them for the first time, to classic music.

The response to these varied activities is surprisingly good, and the patients' active cooperation is secured through their own entertainments committee. Many people today lead an extremely lonely existence, and their very loneliness aggravates their general ill health. In this way a vicious circle may well be set up, and the breaking of it often starts the patient on the road to full recovery.

Procedure on Discharge. — Patients stay for an average period of six weeks. Some time before a patient's discharge careful attention is given to his subsequent placement. The majority of patients are able to return to their normal employment, but some of them come without employment and present difficulties in placement. In order to help in this work, Ministry of Labor

officials visit the center each week and cooperate with the physician and the social worker in the arrangement of suitable employment. In a small minority of cases retraining is required, and here again the Ministry of Labor schemes are found to be most helpful. In all instances a full report of the medical findings and recommendations for future treatment are sent to the physician who referred the patient to the center and to the industrial medical officer of the firm which will be employing him.

Results of Treatment. — The center has now been open for two years, and during this time 688 men and 632 women have been under treatment. A recent follow-up has shown that 84 per cent of these patients are back at full work and well adjusted six months after their discharge. By general consent these results are good, especially in view of the serious condition of many of these persons when admitted.

Future Developments

Building alterations are now in progress that will result in the provision of brief training courses at Roffey Park for industrial medical officers, social workers, labor managers and other persons concerned, so that the various technics which are being developed may be utilized elsewhere. There is no doubt that there is a wide demand for training in social medicine, and this training should be given both in the outpatient department of general hospitals and in hospitals which deal particularly with this type of case.

There is a wide field for research into the multiple causes of ill health of the type under discussion here. Much more is known of all the causes of death in Great Britain than of the causes of ill health, particularly when the latter does not fall into the usual groups, sufferers from which are admitted to the wards of teaching hospitals. In future years these branches of medicine will undoubtedly receive increasing attention. In the meantime, thanks to the help of a wide circle of professional advisers, a worth while beginning is being made at Roffey Park.

September 7, 1946.

Plan now to attend Midwestern Sectional Meeting of the Congress at Percy Jones General Hospital, Battle Creek, Michigan, Friday, Feb. 14, 1947. See detailed announcement page 785 this issue.

THE IMPLICATIONS OF HYDROTHERAPY

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The therapeutic effects of immersing the whole or a portion of the body in water, either plain or mineralized, are twofold — mechanical and thermal.

Mechanical Effects

Mechanical effects depend on how much of the body is submerged and whether the water is plain, naturally mineralized or artificially medicated. It is usual to speak of a full bath when the patient is fully immersed up to the chin, of a three-quarter bath when the water does not come above the costal arch of the patient in a reclining position and of a half bath when the water only reaches the level of the umbilicus with the patient sitting. As what are understood as partial baths depend for the efficacy on their thermal action, their mechanical effects are practically negligible. The addition of a saline substance to water increases its buoyance in proportion to the amount added. It is a common experience that floating in the sea is much easier than floating in fresh water.

The Therapeutic Pool. — To obtain the optimum effect of an immersion bath, the warm pool is required. What is known as the therapeutic pool varies in size from 10 by 12 feet up to 15 by 24 feet. The pool at the British Red Cross Society's Clinic in London is circular, having a diameter of 18 feet and allowing a depth of water of 3 feet, 4 inches. Fixed to the floor is a set of parallel bars on which patients carry out various underwater gymnastics. Steps with a hand rail are provided for entering the bath. Seats are fixed around the circumference of the pool, so that movements involving the shoulder girdle can be performed entirely under water. The temperature of the pool is kept at 100 F. by means of the underwater douche which delivers water under pressure at a temperature of 10 degrees higher than that of the water in the pool.

The underwater douche, with a fairly wide nozzle, is directed against the submerged parts in the body for which treatment is required. Against painful conditions of all kinds it has been a profound analgesic effect. The skin can be seen to be depressed as the douche moves along its surface, and in this way it constitutes a most satisfactory form of massage.

The mechanical effects of the pool obtained by immersing the whole body in water can be explained in the light of the following laws:

1. A floating body displaces its own weight of liquid.
2. A body wholly or partially immersed in a fluid is buoyed up by a force equal to the weight of fluid displaced.
3. Hydrostatic pressure increases in direct proportion to fluid density and vertical depth below the surface level.
4. Pressure on the surface of a moving body is directly related to the velocity of motion.

Movement of the Limbs Against Viscosity. — The internal pressure of a fluid is termed its viscosity. A body sunk to a point where it lies as a dead weight is buoyed up by the pressure exerted by the water, as indicated in

the second law just stated. Being supported at all points by this force, it is in much the same position as if it rested on a table. All that is necessary for side movement is to overcome the dynamic pressure caused by the relative viscosity of body and water and the frictional resistance of the surface of that body. Movement under water, therefore, is merely the result of overcoming the resistance of the lateral pressure and the internal friction of the joints. For this reason, muscles which retain their contractile power but are unable to move a stiffened joint in ordinary circumstances can frequently accomplish this under water. For example, a patient with osteoarthritis of the hip joint, when placed in a warm pool, is at first astonished by the increased range of movement he is able to attain with comparative ease.

Resistive Action in Pulling a Part Downward from the Surface. — This movement (the opposite of the one just referred to), being against the upward water pressure, needs more force in both intrinsic and extrinsic groups of muscles. With a patient floating in a supine position, an attempt to submerge the leg can be carried out only by the intrinsic action of the gluteal muscles, while the back extensors and the abdominals are actively employed in securing pelvic stabilization extrinsically. Lowman¹ summarized the differences between the work of a remedial gymnasium and that carried out in the therapeutic pool as follows: 1. There may be no fixed resting place in water, whereas there is in a gymnasium. In water, muscles contract and move origin and insertion or the one or the other. Fixation in a gymnasium does not allow this freedom of action. 2. In the water, a flow of fixative effort goes completely around the body as though it were a cylinder. More "synergists" are called into play because of the difficulty in obtaining stability. In consequence, an unbalanced strong muscle assumes disproportionate activity — hence greater importance. Lowman has also pointed out that even though a muscle has received special intrinsic training for several years and has apparently reached its maximum recovery in the gymnasium, it may improve still further in underwater work owing to the tension load being increased by voluntary work as an extrinsic stabilizer before continuing its intrinsic action.

Poliomyelitis. — Lowman, as a result of his vast experience in treatment of poliomyelitis in the pool, has expressed himself as strongly in favor of early functional activity and has pointed out that although a patient cannot move a muscle this is not indicative of its total paralysis. Since the nerve supply of most muscles comes from several segments of the spinal cord, the earlier the activities of muscles which remain alive the better. Lowman further said that active movement within a painless arc affects every tissue involved in connection with such function—muscles, tendons, nerves, blood vessels, ligaments, synovia, cartilage and bone. It is therefore important to drain the area involved, to reduce congestion and to lessen the destructive menace of the products of inflammation and hasten their absorption and removal. With these facts in view, action of the spinal and trunk muscles and movement of the vertebral joints should be obtained as soon as possible.

If the important physiologic fact that nothing that any one does to or for a patient can take the place of that which the patient does for himself, it seems obvious that bringing into functional activity the various components of the locomotory system at as early a period as possible within controllable limits and ensuring at the same time that fatigue and pain are avoided must be in accord with natural physiologic laws.

1. Lowman, C. L., and Others: *Technic of Underwater Gymnastics*, Los Angeles: American Publications, Inc., 1937.

Expenditure of Energy. — The relative expenditure of energy in exercises performed in air and in water was investigated by Crowden² some years ago. As a result of experiments carried out at the British Red Cross Society's Clinic for Rheumatism it was found, by estimating the relative increase in the oxygen requirement over the resting level in air and in water that the increased oxygen requirement per minute of exercise was about twice as great in air as in water. The subject of the experiments plainly showed that he was practically exhausted after a period of two minutes of strenuous exercise in air, but under water he could carry on with the same exercise almost indefinitely at the same rate.

It is, of course, a matter of common knowledge that it would be impossible to perform in the air the ordinary motions of swimming for more than a comparatively short time, whereas under water they can be carried out for long periods.

Thermal Effects

Of the various substances used in applying heat to the surface of the body, water possesses many advantages. This is in the main due to its high "specific heat." By "specific heat" is meant the quantity of heat that is absorbed or evolved when a unit mass of the substance undergoes a change of temperature of 1 degree. This varies with the nature of the substance. For example, if equal weights of iron and water are heated to 100 F. and cooled in equal weights of cold water, the hot water evolves much more heat than its equal weight of iron. Water has, therefore, a higher specific heat than iron. Water is the standard by which the specific heat of all substances is measured; it is assumed to be 1.000. That of iron is 0.113; that of glycerin is 0.612, while that of hydrogen is 3.409. If a salt or any such substance is dissolved or held in suspension in water, the specific heat of the mixture will be greater than that of pure water. The specific heat of a brine bath is higher than that of a fresh water bath. Water is an extremely bad conductor of heat; hence the "waterjacket" around a machine to prevent the too rapid dissipation of heat.

Effect of the Application of Heat to the Skin. — The blood vessels of the skin arterioles, capillaries and venules form one of the "blood depots" of the body. According to McDowell, about 10 per cent of the total blood volume is stored in the skin, the other depots being the spleen, liver, splanchnic area, lungs, larger veins and bone marrow. The cutaneous vessels are controlled by the sympathetic nerves, mostly vasoconstrictor, which are specifically abundant in the skin. The skin vessels are readily influenced by changes in the tonic activity of the vasomotor center and respond quickly to thermal, local thermal, mechanical and chemical stimuli. The surface application of heat causes the blood to flow in much larger volume through the dilated peripheral vessels, and the skin becomes reddened in consequence. Besides the dilatation of the arterioles, the number of open capillaries is increased, as is the rate of blood flow through them. At a temperature of 90 to 100 F. the rate of exchange between the blood and the tissue reaches its optimum. In such circumstances the blood entering the veins contains 60 to 65 per cent of its saturation value of oxygen. Too great a heat (105 F. and above), while further increasing the number of open capillaries, accelerates the flow of blood to such an extent that the blood entering the veins simulates arterial blood, with its 91 per cent of its saturated value of oxygen.

As a result of all this, the physiologic mechanism of the body is making a desperate effort to maintain adequate blood volume level. With much of the total blood volume of the body contained in the superficial vessels, there

². Crowden, G. P.: Relative Energy Expenditure in Muscular Exercises Performed in Air and Under Water, *J. Physiol.* 84:31P, 1935.

will be a corresponding paucity of blood in the arteries and the heart will be laboring with marked effort to keep up an adequate circulation. The decreased blood volume leads to decreased venous return flow and causes the heart to beat faster in order to keep up a sufficient volume to carry on the circulation. With reduced circulation, blood volume and concentration of the blood, diastolic filling is profoundly disturbed.

The Therapeutic Application of Water. — Plain, artificially medicated or naturally mineralized water may be used therapeutically in the form of full or partial immersion baths, sprays or douches, with or without massage and manipulation. Water may also be applied to the surface of the body by means of wet packs at various temperatures. Water vapor may be utilized locally or generally. While the immersion of the whole body in water brings all its parts under the influence of the temperature of the medium, the effects of a partial immersion are not confined to the submerged portions alone, as a general effect is produced as well. This will be dealt with later. The same applies to sprays and douches, in addition to which the skin receives an additional stimulus from the impact of the particles of water.

Full Immersion Baths

If full immersion baths are used for therapeutic purposes, temperature and duration are two essential components of a prescription and it is also as well to mention the frequency. If any medicament is to be added it should be so stated.

The Hot Bath. — The temperature should be between 100 and 104 F., possibly higher, according to individual tolerance, and the duration depends on the temperature. Few people can endure a bath at a temperature of 107 F. for more than a minute or so. It should be remembered that an ordinary hot bath cools about 1 degree every two minutes; hence unless hot water is added the bath will have become tepid by the time the usual duration of fifteen minutes is over.

On immersion, the skin quickly reddens, owing to the dilatation of the peripheral vessels. Blood pressure falls. According to Holmes³ the fall is most marked in the diastolic reading. Hill and Flack pointed out many years ago that there is a notable fall in the alveolar carbon dioxide and a rise in oxygen pressure. This would be rather expected, as in a hot bath respiratory movements tend to be almost purely thoracic. As heat which accompanies all bodily metabolic processes cannot be radiated from the surface of the body and eliminated in other ways while the patient is in a bath at a temperature higher than that of the skin, there is naturally a rise of internal temperature. This, of course, varies considerably in different subjects.

It has been found in a series of cases that a plain hot water bath at 104 F. given for half an hour will cause a rise of temperature averaging 5 degrees (98 to 103 F.). In this connection, it is of interest to note that if a man is completely insulated, so that he neither gains heat nor loses it from the surface of the body, the internal temperature will rise 2 degrees (F.) per hour simply as a result of retention of heat which would be otherwise eliminated by the normal resting metabolism. This rise is rather small, owing to the great heat-retaining capacity of water, which constitutes nearly 30 per cent of the bodily weight. Frank Buckland many years ago gave as his definition of the composition of man 45 pounds of carbon and nitrogen diffused through 5½ pails of water. The high heat capacity is, of course, shared by the blood, which enables it to transport large quantities of heat.

³. Holmes, G.: Some Effects of Warm Immersion Baths Upon Circulation, Brit. M. J. 1:68 (Jan. 1, 1930).

Reaction to Hot Baths: The reaction depends largely on the temperature and duration of the bath. With the ordinary hot bath used as a routine measure for personal cleanliness, the reaction is negligible and the same applies to baths given for longer periods at a temperature lower than that of the skin. This is sometimes known as the point of "thermal indifference," usually about 92 or 93 F. Where, however, the bath is employed for therapeutic purposes at a greater heat and for longer duration, a very definite reaction follows which has been summarized by Kellogg⁴ as follows "vasoconstriction; pallor of the skin; a frequent low tension pulse, respiration frequent, free and superficial; lessened perspiration; gradual cooling of the skin; depression of internal temperature from increased skin elimination and decreased heat production; diminished nervous and mental irritability; drowsiness and indisposition to effort."

Indications: A hot bath is an almost universal remedy for the removal of the effects of muscular fatigue and stiffness following strain or injury. For the symptomatic relief of spasmodic conditions such as dysmenorrhea, bronchitis and hepatic and renal colic, the prolonged hot bath is frequently of great value. In some cases of urinary retention a hot bath often gives instant relief.

Hot baths artificially medicated or naturally mineralized with a saline substance, such as brine, are of outstanding value in the treatment of various rheumatic affections. They are also used for the same purpose when mixed with mud or peat to the consistence of thick porridge. It will be remembered that baths of this kind retain their heat for a much longer period than the ordinary plain water bath. With a plain hot water bath the water absorbs a certain amount of heat from the body if it is allowed to cool. With a brine or peat bath this does not occur to the same extent. In other words, a patient in such a bath is much more "insulated." The rise in temperature is therefore greater in the latter circumstances. The sweating in a brine or peat bath is much more copious than that when fresh water is employed.

Partial Baths

Partial baths depend for their efficacy upon an observation made many years ago that a thermal stimulus applied to a comparatively small portion of the skin can bring about a general reaction. This phenomenon was extensively studied by Prof. Georg Hauffe, who divided local heat stimuli into two classes: (1) sudden or sharp, whether by hot or by cold mediums, and (2) slowly rising by heat. The late Dr. Fortescue Fox employed a method of administering an arm bath which he described as follows: Both arms are immersed in a single bath at about "blood heat." The water is gradually warmed by an electrical resistance giving a uniform augmentation of heat in unit time of 1 degree (F.) per minute. Thus a bath of from twelve to twenty minutes' duration would begin at 100 F. and finish at 120 F. His preliminary observations in cases of vascular hypertension show a fall of both systolic and diastolic pressure after a single bath, sometimes to from 5 to 15 mm. in the diastolic reading. The reduction of pressure is believed to last from two to six hours. Little or no discomfort is caused, but there are some flushing and general perspiration. Pain and dyspnea if present are relieved. It seems to be a safe and effective method of producing, at all events temporarily, a general peripheral dilatation.

It is suggested that with suitable technic this method of augmenting heat will be found of special value in the common variety of high blood pressure, which shows periodic crises, or waves, of vascular hypertension and probably also in many chronic conditions (rheumatic and otherwise)

4. Kellogg, J. H.: Rational Hydrotherapy, Philadelphia: F. A. Davis Co., 1906.

with poor circulation, angospasm, subnormal temperatures and even Raynaud's disease and chillblains.

The Sitz Bath. — An ordinary hip bath can be used and a slowly rising temperature brought about by removing a cupful of water every two minutes and replacing it by the same quantity of very hot water, the whole process being controlled by a bath thermometer. The heat should be increased 1 degree every two minutes. If the sitz bath is furnished with both a supply and overflow pipe it is much easier to maintain a regular increase in temperature.

Indications: This form of local heat stimulus induces a general reaction — progressive vasodilatation, increased circulation in the capillaries and veins and changes in the distribution of the blood. The vasodilatation is thought to affect not only the skin and the subcutaneous tissues, muscles and bone but also the liver, spleen and pelvic organs. The sitz bath relieves pelvic pain by the cutaneous hyperemia, reducing the congestion of deeper organs. It has been found to allay the flatulence and meteorism associated with psychasthenic states, especially if given along with a hot abdominal pack.

The Glove Bath. — The hands enclosed in rubber gloves — a few sizes too large, if possible — or the feet encased in rubber socks reaching half way up the calf are immersed in hot water, maintained at a temperature of from 110 to 120 F., for twenty minutes to half an hour daily on alternate days. Ordinary surgical gloves are used, and, if a rubber sock cannot be obtained, a large sponge bag will do equally well provided it is waterproof. If considered necessary, an ointment of wintergreen (methyl salicylate), iodine or menthol can be well rubbed into the part either before or after putting on the gloves. Owing to the retention of heat and the raising of the local internal temperature, it will be found that when the gloves or socks are removed the parts are bathed in copious perspiration and are much more supple. Massage can therefore be much more efficiently carried out, as all muscular spasm is temporarily relieved. The immersion of the hand or foot enclosed in a waterproof covering has much the effect of a mud pack or paraffin wax application and can be used as a substitute for such measures.

Indications: This method is of value in the treatment of arthritic changes with the consequent stiffness, pain, swelling and deformities in the wrists, fingers, ankles and feet; sprains and strains of the feet or wrists; stiffness following old injuries; fibrositis of the plantar or palmar fascias; in the manipulative treatment of flat foot where muscular relaxation is required; in fact, for any condition in the hands or feet in which pain and stiffness are prominent symptoms.

Packs

At one time, in establishments where the so-called "water cure" was carried out, the employment of wet packs of various kinds occupied a prominent place in their therapeutic resources. For some reason or another, in late years these have not received anything like the general consideration they deserve, and anything that can be done by way of reviving interest in what are not only valuable but convenient, readily accessible and easily prepared forms of treatment, is well worth while.

Wet packs at various temperatures may be either full or partial and, if the latter, can be applied to any portion of the body it is considered desirable.

Full Wet Pack. — The full wet pack is applied in the following manner:

Two large woolen blankets are spread on a mattress protected by a rubber sheet, projecting a foot beyond its extremities. A sheet wrung out in water at the desired temperature (70 to 100 F.) is placed on top. The patient, fully undressed, is placed on his back on the wet sheet with his arms raised alongside his head. He occupies the

junction of the middle third with the right of the sheet. The right third of the sheet is now drawn across the body and tucked in along the left side of the trunk and the lower portion placed between the legs. The arms are then lowered alongside the body. The left overhanging portion of the sheet is brought over from the left to right so as to envelop the arms and the entire body and tucked along the right side of the trunk and legs. The blanket is now drawn firmly from the left and tucked under the right side of the body, the right border being drawn over the left and firmly secured under the body. The upper corner is drawn around the neck and secured beneath it. The lower border is firmly tucked around and under the feet. Over this more blankets are placed. All air must be excluded from the blanket cover.

Effects: If the full pack is applied cold (60 to 80 F.), the first reaction is one of irritation of the cutaneous vessels and nerves, causing contraction of the former, which continues until the reactive powers come into play. This depends on the age and condition of the patient. As he is lying quite passive with no mechanical aid, such as massage, the reaction is entirely dependent on his vitality. When the reactive powers are deficient the cold pack should not be used but one at a higher temperature.

Following the first shock of the cold which only lasts a very short while, the cutaneous vessels dilate, warm blood flows from the deeper parts to the periphery and the temperature between the skin of the patient and the sheet gradually becomes equalized. There is no sense of chilliness in the treatment of pyrexia in this way (if considered desirable) because the cooled blood is driven inward and warm blood takes its place. It is, of course, fully realized that is not usual to treat ordinary degrees of pyrexia *per se* but in cases in which there is a tendency to hyperpyrexia and delirium the full wet pack will probably meet the indications better than anything else.

The continuous interchange of temperature gives rise to vaporization from the sheet, which furthers the loss of heat from the skin, which is again increased by radiation from the blanket. As soon as the temperature of the body and of the sheet are equalized, the patient becomes drowsy no doubt owing to the relative anemia of the brain from the determination of the blood to the periphery. In addition, the quiescent state of the patient and the removal of all those external reflex influences that arise from excitation of the peripheral nerves must contribute to the calming effects of the full pack.

Indications: In those comparatively rare instances in which the abstraction of heat is the chief aim, the temperature of the sheet should be 60 to 70 degrees F. for the first pack. After the patient is comfortably warm, it is removed and another at a temperature 2 degrees higher should be substituted, and when this is warm still another, at a temperature 2 degrees higher, is put in its place and so on until four to six packs have been applied. For sedative effects the patient should be allowed to remain for four to six hours in the same pack and sleep should be encouraged. When he awakens a cold or tepid sponge all over the body should be given to restore tone to the relaxed cutaneous vessels. In cases of insomnia, delirium and general restlessness in nerve conditions, the full wet pack can take the place of hypnotic drugs and the sleep evoked by its use is far more refreshing and health giving.

***The Abdominal Pack.* — The abdominal pack is applied in the following way:**

A mackintosh sheet and a small blanket are folded to a breadth of about $2\frac{1}{2}$ feet and placed across a couch or bed. A flannel pad folded eight times so that it measures 22 by 11 inches is wrung out in water at the desired temperature (cold 60 F., hot 110 F.). This is laid over the abdomen reaching, from the ensiform cartilage to the pubis and tucked well into each flank. The blankets are now brought over and tucked beneath the patient. Hot water bottles are laid along each side, and the mackintosh sheet with more blankets covers the lot. A cold, wet towel should be wrapped 'round the head. The duration of the pack should be about thirty minutes.

Effects: A tepid or cold abdominal pack at first causes a contraction of the peripheral vessels with deepening of the respiratory movements. With the onset of the usual reaction the epigastric region is covered by a warm moist vapor, which exerts a sedative effect on the cutaneous nerves and brings about a certain degree of decongestion of the deeper organs. The tepid or cold abdominal pack may be employed under much the same conditions as the full pack, being easier to apply. It is valuable as a sedative in states of excitement, insomnia, etc. It has been advocated in cases of obstinate (reflex) vomiting in which other measures have failed. Winternitz claimed that patients could often take food during the application of the pack, and the food was often retained after removal of the pack.

The hot abdominal pack, prepared in the same manner but with hot water, is usually given along with some other treatment, such as a hot sitz bath. As already pointed out, this combination appears to be efficacious in dealing with the meteorism associated with psychasthenic states. It is also used in the spasmodic attacks accompanying the so-called "spastic colon." Care must, however, be taken not to overlook an inflamed appendix.

The Local Hot Pack. — Local hot packs can readily be prepared by the following method:

A large towel or piece of flannel is folded to a size to cover and overlap the part to be treated, and the fabric is wrung out in very hot water by twisting it in another towel; it is then applied. The pack should be maintained in place by a blanket or folded waterproof sheet until it is nearly cool, when it should be removed. Spongio-pilene, which consists of thick felt with a waterproof India rubber backing, can be used in exactly the same way and constitutes a very convenient method of applying a hot moist pack.

The local moist hot pack forms an excellent preliminary to deep massage. The skin is softened, and freer movement can often be obtained in stiffened joints. It is specially indicated in the treatment of fibrosis, whether in the shoulder girdle, back, lumbar region or gluteal region. The pain due to sciatic neurofibrosis is greatly relieved by its use. For some unexplained reason, moist heat suits these conditions much better than the dry heat obtained from a radiant heat apparatus. Its action is very much that of a mud, peat or paraffin wax pack, and it is certainly much easier to apply.

Summary

The mechanical and thermal effects of immersing the body wholly or partially in water, plain or medicated, at various temperatures, are discussed.

The employment of wet packs, full or partial, at varying temperatures, is also considered with special reference to their therapeutic indications.⁵

⁵. Ray, M. B.: "Glove Bath" Method of Treating Rheumatic and Other Affections of Hands and Feet, Brit. M. J. 2:100 (July) 1932; Physical Methods of Treating Rheumatism, Brit. M. J. 1:1265, (June 20): 1310 (June 27) 1936.

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PROBLEMS OF PHYSICAL THERAPY FOR PERSONS WITH TRAUMATIC PARAPLEGIA

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Experience during the recent war has shown that the modern principles of rehabilitation can be successfully applied in almost every case of spinal cord and cauda equina injury. Physical therapy plays a most essential part in the various activities concerned with rehabilitation in such cases, and it is imperative that the work of the physical therapist be in concert with that of the other members of the team—i. e., nursing staff, physical therapy instructor, occupational therapist and vocational training instructor.

In the present paper, a short account is given of the methods of physical therapy which have been found most effective for the physical restoration of paraplegics in this center in more than 160 cases. Other problems of rehabilitation in paraplegics have been published elsewhere.¹

The two fundamentals in the physical treatment of paraplegics are early start and continuation. The aims of physical therapy can be divided into two main groups:

(A) Prevention of contractures and atrophy in the paralyzed parts of the body, and (B) adaptation therapy of normal parts of the body (compensatory training).

Prevention of Contractures and Atrophy

Position of the Paralyzed Limbs. — In the early stages, the physical therapist has to assist the nursing staff in keeping the paralyzed limbs in a proper position, in order to prevent adduction of the legs, drop foot, claw toes and pressure to the neck of the fibula.

Permanent fixation of paralyzed limbs in any position is discouraged. In particular, in case of lesions of the cord, the permanent position of the lower limbs in adduction and semiflexion, by placing pillows under the knees, is deprecated, as this must inevitably lead to adduction and flexion contractures. Flexion contractures of knee joints are a serious complication to the flexor spasms, due to permanent irritation of sensory organs in the contracted joints and tendons. They themselves promote violent flexor spasms, once the flaccid stage of the cord injury has passed and the automatic reflex activity of the spinal cord below the level of the lesions has developed. In case of cauda equina lesions, contractures often develop in flexion of the hip and extension of the knee and adduction of the leg, if the care of the patient's position in the early stages has been neglected. This occurs, in particular, in lesions below the second and third lumbar vertebrae, where the intact iliopsoas, quadriceps, adductors and in rotators have an unrestrained overaction, due to the paralysis of their antagonists.

The most deleterious type of contracture was found in patients admitted in plaster beds in which they had lain for months. It took months and years of hard work to remedy, or at least diminish, the damage done by this form of fixation. It is therefore obvious that plaster beds are strongly deprecated in this center, as being absolutely contrary to the fundamentals of rehabilitation for paraplegic patients.

1. Guttmann, L.: Medical Times 73:318, 1945, Brit. J. Phys. Med., 9:130, 1946.

Passive Movements. — Passive movements to all joints of the paralyzed limbs are started immediately after injury and are given once or twice daily to prevent contractures and promote better circulation in the limbs. Better circulation can also be promoted by massage, which, however, has to be carried out with caution, in order not to produce peripheral damage to the paralyzed tissues. In all patients admitted to this center in later stages after injury, who already had more or less severe degrees of contracture, regular passive movements have proved most beneficial in overcoming the contractures. It cannot be too strongly emphasized that even extreme degrees of flexor spasms and contractures in paraplegic persons can be greatly improved by this conservative measure, especially if the passive movements are carried out in a continuous bath. Therefore, operative measures, such as elongation of tendons, section of nerves and section of spinal roots, should be considered only in selected cases. The effect of treatment is judged by regular measurements every week or fortnight, so that at the end of treatment a chart is obtained.

Electrotherapy. — In lower motor neuron lesions, such as lesions of the cauda equina and cervical roots, daily electrical stimulation is beneficial in promoting better circulation and delaying atrophy of the denervated muscles. Electrotherapy, in the form of galvanism and faradism, is used in these cases as an exercise to the paralyzed muscles in place of their normal contractions.² It is started as early as possible (seven to ten days after injury), and it is applied in increasing numbers of contractions (200 to 600 to each muscle group). From experience gained on the subject of electrotherapy for cauda equina lesions, it can now be concluded that if after four to six months return of function is confined to muscles supplied by the upper lumbar roots, which are important for standing and walking, electrotherapy should be centered solely on these muscles and may be discontinued on the others.

Adaptation Therapy of Normal Parts of the Body (Compensatory Training)

Hand in hand with passive movements of the paralyzed limbs go exercises of the normal parts of the body. These are carried out from the early stages, with a view to readjusting the vasomotor control to postural changes and to overdeveloping those muscles which are essential for the patient's upright position and those which have a synergic function on the paralyzed muscles and can compensate for their loss. Moreover, the early restoration of an upright position is a most essential measure in preventing congestion of waste products in the urinary tract—especially stone formation.

Lesions of the thoracic cord, conus and cauda equina, with complete paraplegia, everything is done to strengthen the activity of the abdominal muscles, erector spinae, latissimus dorsi and quadratus lumborum, for the following reasons:

(a) The combined operation of these muscle groups will greatly improve the balance and mobility of the trunk.

(b) A strong action of these muscles will help to shift the psychomotor capabilities in the paraplegic person from the paralyzed distal parts to the upper parts of the body, for it makes the activity of the normal upper limbs more effective, owing to the increased fixation of the trunk.

(c) The combined operation of these muscle groups will restore the ability of the paraplegic patient to walk in parallel bars or on crutches, by pelvic tilting. To keep the balance in these cases, it is necessary to fix the knees by light bivalved plaster splints (fig. 1A) and later by calipers (fig. 1B), keeping the feet at the correct angle by simple toe springs; thus the paralyzed legs are being used like stilts.

². Guttman, E., and Guttman, L.: J. Neurol. & Psychol. 7:7, 1944. Jackson, S., and Seddon, J.: Brit. M. J. 1:485, 1945.

(d) The training of the abdominal muscles is also of great importance for the restoration of bladder function and reeducation of the bladder. It must be remembered that in these distal lesions voluntary micturition is carried out with the help of pressure of the abdominal wall. It is obvious that the stronger the abdominal muscles, the sooner and more effective the voluntary micturition and the sooner can the suprapubic drainage be abandoned. The same principles also apply to the restoration of the bowel action in these paraplegic persons.

(e) Last, but by no means least, the training and overdevelopment of the abdominal and back muscles are of great value for restoring the sexual

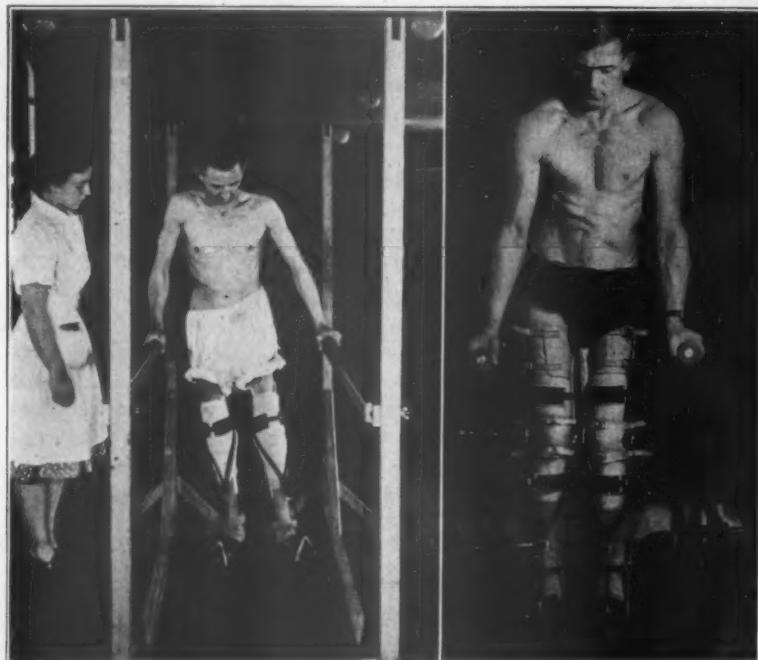


Fig. 1.—A, paraplegic patient, with a complete transverse lesion at the twelfth thoracic segment, doing walking exercises in parallel bars, with training plaster splint and toe-raising spring. B, paraplegic patient, with a complete transverse lesion at the tenth thoracic segment, doing walking exercises in a walking chair with calipers. Note the hypertrophy of the upper abdominal muscles and of the intercostals above the level of the lesion.

function of paraplegic patients. Experience in this center has shown that these men are by no means as hopeless in carrying out marital activities as was previously thought, and the training of these muscle groups is one of the main factors in the sexual rehabilitation of persons with low thoracic and cauda equina lesions. This achievement has, of course, an enormous psychologic effect on the man.

The following are some of the special methods applied for compensatory training.

Sling and Spring Exercises. — Self-assisted movements by suspension methods in slings and exercises against resistance by means of pulleys and weights are employed, and each ward in the center is equipped with one or two Guthrie Smith apparatuses. They have proved very effective for all kinds of spinal cord lesions, the duration and intensity of the exercises being gradually increased. Swinging exercises in slings are of great value, in particular in lesions of the upper thoracic cord, for two reasons:

(a) They promote superdevelopment of the pectorals, serratus anterior, latissimus dorsi, trapezius and other muscles of the shoulder girdle, which

in these high lesions are the only muscles which will develop and guarantee the balance of the body in the upright position. Figure 2 shows a patient of 20 with a complete transverse spinal lesion at the third thoracic vertebra doing his sling exercises. Note the hypertrophy of latissimus dorsi trapezius, pectoral and serratus anterior muscles. The patient has learned not only to swing his whole body with these muscles but also to stop swinging immediately on command.



Fig. 2.—Paraplegic patient, with a complete transverse lesion at the third thoracic segment, doing sling exercises. Note the hypertrophy of the pectoral, serratus anterior, latissimus dorsi, trapezius and teres major muscles.

(b) These exercises are of immense importance for the restoration of the vasomotor control during postural changes, which is crippled in these high lesions by the interruption of the efferent part of the splanchnic outflow. Such patients, when raised from the horizontal to the upright position, will tolerate this position, especially standing, very badly, owing to the profound disturbance of their postural adaptation mechanisms. This results in rapid and uninhibited accumulation of blood in the abdominal area and in the lower limbs, with resulting decrease in the supply to the central veins and consequent insufficient cardiac output. The blood pressure shows rapid and steep fall; the pulse rate is raised to the highest level, and syncope follows in a few seconds or minutes. However, a patient with a high thoracic lesion, but well trained by swinging exercises, has much less difficulty in overcoming

the postural circulatory disturbances. It must be assumed that the adjustment forces regulated by the carotid sinus and other blood collectors have been sufficiently developed to act as "emergency adaptors," in order to compensate for the loss of splanchnic control. The adaptation to the upright position in patients with high cord lesions can also be facilitated by preventing blood from accumulating in the lower parts of the body by the use of an abdominal binder or belt.

Dressing Exercises. — Another example of exercises to adjust paraplegic persons to postural changes while in bed and to prepare for their future independence is a dressing exercise. The paralyzed patient is taught and encouraged to dress himself in the minimum of time, including hoisting himself from his bed to his wheelchair, either with or without the aid of the chain and handle fixed over his bed. The record time for dressing achieved so far, by a patient with a complete lesion at the eleventh thoracic segment resulting in complete spastic paraplegia and sensory loss, is just under four minutes. In this time, the patient, lying on his bed and naked save for a pair of shorts, put on his shirt, tie, two pairs of trousers, socks, jacket and shoes and swung himself into his wheelchair. Patients with higher cord lesions or those with lower ones with marked reflex spasms or superimposed stiffness of the joints naturally need longer time, but it can be expected that even patients with lesions at the level of the third thoracic vertebra will succeed in dressing themselves in fifteen minutes if these exercises are done regularly.

Balance Exercises. — As soon as possible — in some cases of complete transverse lesions five to eight weeks after injury—the patient is promoted to a wheelchair. This in itself adds greatly to his range of activity. In certain cases, especially those of patients with complete lesions of the mid and upper thoracic region, in whom most or all abdominal and trunk muscles are paralyzed, special exercises with arm raising in various directions in sitting position in front of a mirror are added, and they have proved invaluable in restoring and improving the patient's balance.

Walking Exercises. — When the muscle power in the normal parts and balance of the body have sufficiently improved, standing and walking exercises are started in parallel bars or walking chairs, followed by walking on arm and elbow crutches. The exercises are carried out first in the ward, to encourage other patients who are not so far advanced. They are continued later in the physical therapy department and the long corridors of the hospital, the time and distance of walking being gradually increased. In certain cases, rhythmic walking to music has been included in these exercises and has proved beneficial. Naturally, the walking capability of a paraplegic person, especially with a cord lesion above the tenth thoracic segment will always be very limited, but patients with lesions below the level—for instance, at the twelfth thoracic segment, with complete paralysis of both lower limbs and sensory loss below the twelfth thoracic and first lumbar segments, have succeeded with training in walking 250 yards in thirteen and one-half to sixteen minutes on elbow crutches. The higher the spinal cord lesion, the more is the propulsion of the body achieved by the isolated action of the muscles of the shoulder girdle, but, however small the walking capabilities of a paraplegic person may be, it will increase his range of activity and independence, especially when discharged from hospital. Moreover, the psychologic effect of this achievement on the man—to be once again on his own feet—is immense.

Appliances. — As pointed out, the purpose of calipers for a paraplegic person is to keep the knees fixed in extension and the feet at the correct angle, to enable the man to use his paralyzed legs as stilts. Therefore, the calipers are adjusted with locking knee joints, the feet being raised by a simple toe-

raising spring (fig. 1B). Care is taken to ensure that the thigh corset is not too high, so as to prevent any pressure to the region of the ischial tuberosity. Unfortunately, this point is all too often overlooked, and the consequences are pressure sores in that region, which are characterized by a slow healing tendency. The thigh and calf corsets are fastened by leather bands and not by laces, to enable the patient to put the calipers on in the minimum of time. For all persons with lower cord, conus and high cauda equina lesions, pelvic bands and abdominal corsets are deprecated, for various reasons. They are



Fig. 3. — Wheelchair polo

unnecessary for restoring or supporting the balance of the body, as, in case of these lesions, the man has learned to achieve this with the normal parts of the body. Moreover, as pointed out, walking is achieved by pelvic tilting with the abdominal and back muscles; therefore, any fixation of the pelvic area and trunk must inevitably impede the function of these muscles and consequently the walking capability. Furthermore, any appliance to the insensitive pelvic area increases the danger of pressure sores. Only for selected patients, with deformities of the hip joints, may a pelvic band, and even a corset, be indispensable for protection against dysbalance and prevention of further deformity. For patients with higher cord lesions with

paralysis of abdominal and trunk muscles, the combination of the calipers with a brace of the Taylor type will be necessary. But whatever type of caliper or brace is indicated, greatest attention should be paid to its weight, which should be as little as possible. It must be remembered that these men have already to lift and to move the paralyzed part of the body with the remaining normal muscles, and it is, therefore, quite obvious that every ounce of additional weight counts and means a further burden to the man, causing fatigue and incapacity. The same applies to the employment of crutches, especially elbow crutches, which often are too heavy and which should also be made from duraluminium or hiduminium.

Games. — Wheelchair Polo: Games play an important part in the physical and psychologic readjustment of paraplegic patients. A large number of games, such as ball games, including punchball and netball, darts, snooker and skittles, can be adapted to the limited abilities of persons with paraplegia. Ball games are started in the ward while the patient is laid up in bed with his pressure sores and urinary infection, and these not only are enjoyed by the patients but have proved very successful in promoting activity and are good exercise in the development of the shoulders and trunk muscles. Every ward is also equipped with a dart board, to give those patients who are up in their chairs the opportunity to play during the day or in the evening, and matches have clearly shown that a paraplegic person can easily compete with a normal person in this game.

I have improvised and introduced a special form of polo, played in wheelchairs. This wheelchair polo not only exercises the whole of the upper part of the body and promotes great improvement in the circulation in both the normal and the paralyzed areas of the body, but also requires quick thought and good judgment, which keeps the man's intelligence and concentration lively. In time, these men acquire an incredible skill, and it is most interesting to watch the ease and dexterity with which the well trained players (nicknamed "the professionals") carry out the most difficult movements in their chairs. The man and his wheelchair seem to have merged into one being, just as a jockey and his mount are one. After a good match, the men will discuss the game, as normal people discuss cricket or football, and it certainly has proved invaluable in distracting the patients' attention from their disability. Any team of normal people (even when specially trained in wheelchairs), which has tried to outmatch "the professionals," has always been easily beaten. This game can be played by any number of patients but it is usually played with four on each side. Short mallets are used, and the game is played with a rubber disk in the gymnasium, or with a weighted ball out in the open air. (Figure 3 shows action shots during a match.)

Summary

An account is given on methods of physical readjustment practiced in a Spinal Center in over 160 cases of spinal injuries.

The aims of physical therapy for paraplegic patients can be classified into two main groups: (a) prevention of contractures and atrophy in the paralyzed part of the body, (b) adaptation therapy of normal parts of the body.

The significance of the overdevelopment of those muscles which can compensate for the loss of the paralyzed muscles is discussed.

Swinging, dressing and balancing exercises have proved invaluable in the mobilization of compensatory mechanisms for the postural adaptation of paraplegic patients.

Games, especially wheelchair polo, play an essential part in the physical restoration of persons with traumatic paraplegia.

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. . . EDITORIALS . . .

THE SEASON'S GREETINGS

With the approach of the end of the year and thoughts given to the Yuletide Season, we sincerely appreciate the opportunity of living in a world nominally at peace. After the previous years with their suffering, we can only think the more seriously of our own responsibility in the world today and what we, as individuals, may be able to do that will help prevent the occurrence of world wars.

The Congress will be successful in its work only as it serves, first, those who are its members in providing them with better information and opportunities for reporting their findings and experiences in the field of physical medicine. Second, we must be of service to the medical profession as a whole in the careful evaluation of what physical measures can do in providing treatment for the sick and ailing patient. In the third place, our responsibility is service to our patients to whom we may be able, with the means at our command, to bring some relief to pain, suffering and disability, which will make their life brighter and happier in the months and years to come.

One important phase of our work is the award of the Gold Keys, through which we wish to express our appreciation to the men and women who have pioneered and greatly aided the development of physical medicine. It is important that the Committee on Gold Key Awards be advised promptly by the members of the Congress of the names and the accomplishments of any person who is worthy for consideration as a candidate for this Award.

In 1943 it was voted by the Congress that the recommendations of the Committee on Gold Key Awards should be reviewed by the Executive Committee of our Congress. In this way a more general and representative opinion will be expressed, making the award of our Gold Key a real distinction and honor for the recipient.

At this Season then, the officers of the Congress of Physical Medicine and the Editorial Staff of the Archives of Physical Medicine extend the Season's Greetings to all our members, subscribers and advertisers in the hope that the Congress and its publication will fill an increasingly greater place in the field of physical medicine during the coming years.

WALTER S. McCLELLAN, M.D., President.

THE BRITISH NUMBER OF THE ARCHIVES

In response to the invitation of the Board of Governors of the American Congress of Physical Medicine the British Association of Physical Medicine has designated a group of its members to contribute articles for a special issue of the ARCHIVES OF PHYSICAL MEDICINE. These contributions appear in this issue of the ARCHIVES, with a foreword of the distinguished leader of physical medicine in Britain, Lord Horder, and American physicians and all other readers of the ARCHIVES will undoubtedly receive them with great interest and profit.

Present day physical medicine owes much to the fundamental work of British physicians, physicists and other scientists, dating back many centuries. To mention just some of the highlights, the first book on the nature of magnetism and electricity was written in 1600 by William Gilbert,¹ physician to Queen Elizabeth; as is well known by this time, he was the man who coined the term "electric." The discovery of electromagnetism by Michael Faraday in 1831 not only opened up the modern era of electric power and of all electromagnetic devices, but also furnished the most important instrument for the development of electrophysiology and for the classic method of electrodiagnosis. Isaac Newton became the founder of light therapy when in 1666 he split a beam of sunlight through a prism into the colors of the rainbow. William Herschel subsequently discovered the invisible infra-red rays in Newton's spectrum. Humphrey Davy produced the first carbon arc light from a series of galvanid cells. John Floyer's treatise on cold bathing in 1697 marked a turning point on the century old neglect of water treatment. British spas have for many decades served as examples of well organized balneotherapy. John Hunter, famous surgeon and physiologist, was the first to lay down the principles of muscle reeducation in 1776. No wonder that with all this background, physical medicine received much impetus in England in modern times. The names of the late Lewis Jones, Turrell and Cumberbatch stand out as pathfinders and leaders in electrotherapy. James B. Mennell has been a protagonist of the scientific use of massage and exercise, and Morton Smart has taught the value of manipulation and of graduated muscle exercise. Leonard Hill and the late Eidinow led the way in the applied physiology of radiant energy. Fortescue Fox is still a pioneer of modern balneotherapy and rheumatology, and so on. The names of many of these men and of a number of others appeared on the membership roster of the American Physical Therapy Association, now amalgamated with the American Congress of Physical Medicine, and for many years before the world wars there has been exchange of visits and scientific contributions between the United States and Britain. The very term of physical medicine was first employed in Britain and American physicians still remember the impressive proceedings of the Sixth International Congress on Physical Medicine,² held at London in May, 1936 and the splendid hospitality extended to them. The community of professional and social ideals and the sameness of language should form a strong bond between physicians practicing on opposite shores of the Atlantic Ocean; furthermore, the present problems in physical medicine are much the same in both countries, as pointed out so well recently.³ At the 1946 annual meeting of the American Congress of Physical Medicine Sir Morton Smart was warmly welcomed as a delegate of the British Association of Physical Medicine and proved to be an inspiring ambassador of good will.

1. Gilbert William, Colcestrensis: *De Magnete, Magneticisque Corporibus, at de Magno Magnete Tellure; Physiologia Nova Plurimis at Argumentis et Experimenta Demonstrat*, London, 1600.

2. Kovacs, Richard: The Sixth International Congress on Physical Medicine, *Arch. Phys. Med.* 17: 581 (Sept.) 1936.

3. Smart, Sir Morton: Physical Medicine in Britain, *Arch. Phys. Med.* 27:263 (May) 1946.

It is to be hoped that in the years to come the number of exchange visits and other forms of professional and social contact between physiatrists in the United States and Britain will steadily increase. The time is ripe for extensive international cooperation as already urged editorially,⁴ and for laying plans for the holding of the next International Congress on Physical Medicine in the United States. This should enable a large delegation of our British confreres to visit our institutions and to unite with us to raise the scientific and clinical status of physical medicine to the highest possible level. In the meantime it is our privilege to express the appreciation of the editors of the ARCHIVES and of the membership of the American Congress of Physical Medicine to the British contributors of this issue.

4. International Cooperation, Editorial, Arch. Phys. Med. 27:167 (March) 1946.

MEDICAL NEWS

New Officers Section on Physical Medicine Southern Medical Association

Officers for 1947 for the section on Physical Medicine of the Southern Medical Association are as follows: Chairman, Dr. F. A. Hellebrandt, Richmond, Va.; Vice-Chairman, Dr. Wayne McFarland, Takoma Park, Maryland, and Secretary, Dr. George Wilson of Ashville, N. C. The time and place of the meeting for 1947 will be announced sometime in the early part of 1947.

New Officers Southern California Society of Physical Medicine

New officers elected for the year 1947 of the Southern California Society of Physical Medicine are:

President: O. Leonard Huddleston, M.D., Associate Professor of Medicine and Director, School of Physical Medicine, University of Southern California College of Medicine; Consultant, Physical Medicine and Medical Rehabilitation, Branch 12, Veterans Administration; Director, Department of Physical Medicine, Los Angeles County Hospital. Vice-President: Louis P. Biro, M.D., Director, Department of Physical Medicine, California Hospital, Los Angeles. Secretary-Treasurer: Theodore Stonehill, M.D., Acting Chief, Physical Medicine; Physician-in-Charge, Medical Rehabilitation Service, Veterans Administration General Hospital, Los Angeles.

Physical Medicine Consultants Announced by Secretary of War

One hundred and twenty-two outstanding experts in the nation's medical profession were appointed civilian consultants to the Secretary of War through

the Surgeon General, the War Department announced recently.

Physical Medicine consultants are: Dr. Frank H. Krusen, Mayo Clinic, Rochester, Minnesota; Dr. Kristian G. Hansson, the New York Hospital, New York City, and Dr. Richard Kovacs, 2 East 88th Street, New York City.

Howard Rusk to Head New Department

Dr. Howard A. Rusk, who established the Army Air Forces rehabilitation program in 1942 and now is associate editor of the New York Times and consultant in medical rehabilitation to the medical director of the Veterans Administration, has been named to head a new department of rehabilitation and physical medicine at the New York University College of Medicine. The department will train all students through their medical college years in what is termed the "third phase of medical care," that is, preparing the patient to go from "the bed to the job." The department is an out-growth and expansion of a division of physical medicine set up early last year as a part of the department of medicine under a grant of \$250,000 from the Baruch Committee on Physical Medicine in 1944. Dr. George G. Deaver, clinical professor of physical medicine, is to continue as head of the physical medicine division of the new department. The new unit will cooperate closely with the city department of hospitals in establishing a supervising rehabilitation program in all city hospitals. Forerunner of the programs planned for other hospitals is that of Bellevue, where severely disabled persons have been given rehabilitation treatment and training under the direction of Dr. Deaver for the past two years. A special rehabilitation program has recently been inaugurated at Seaview Hospital on Staten Island, and plans are under way to start other special rehabilitation projects at Goldwater Memorial Hospital.

Refresher Course in Physical Medicine at University of Kansas

The Postgraduate Committee of the University of Kansas School of Medicine is offering a four day refresher course in physical medicine to be held at the School of Medicine, Kansas City, Kansas, January 13th through 16th, 1947. The course will be designed for physicians and registered physical and occupational therapists. In addition to members of the University of Kansas faculty who will take part in the program there will be several guest instructors, including Dr. Robert L. Bennett, Director of Physical Medicine at the Georgia Warm Springs Foundation, Dr. W. A. Selle, Professor of Physiology at the University of Texas Medical School and Dr. Grace M. Roth, Mayo Clinic, Rochester, Minnesota.

Tuition for the course will be \$20.00 for physicians, \$5.00 for physical and occupational therapists. No fees will be required from veterans of World War II, or present members of the Armed Services or Veterans Administration. For further information write to Mr. Harold G. Ingham, University Extension Division, University of Kansas, Lawrence, Kansas.

Veterans Administration Items of Interest

Dr. Paul B. Magnuson, professor of surgery and chairman of the Department of Bone and Joint Surgery at Northwestern University Medical School, Chicago, is acting assistant medical director for Research and Education, Veterans Administration. He is an attending surgeon at Passavant Memorial Hospital, Chicago, and senior consulting orthopedic surgeon at Wesley Memorial Hospital, Chicago. Dr. Magnuson also is civilian consultant to the Surgeon General, U. S. Army.

Dr. Nicholas D. Mauriello has been appointed Chief, senior grade, specialist in Physical Medicine for the Veterans Administration, Wilkes-Barre, Pa., regional office which covers about thirteen counties. Dr. Mauriello, a member of the Congress is in private practice in Wilkes-Barre and specializes in physical medicine.

Arrangements have been completed to provide special orthopedic footwear for veterans with service connected foot disabilities.

The Veterans Administration will take over the installation (formerly the Newton D. Baker General Hospital) at Martinsburg, W. Va., as soon as the War Department's inventory has been completed. The personnel including the physicians and nurses are now being recruited. It is believed that this hospital will be used by the V. A. until new veterans' hospitals are completed in West Virginia and Pennsylvania.

The Veterans Administration announces that the President and the Federal Board of Hospitalization have approved the construction of a 750 bed

general medical and surgical hospital at Atlanta, Ga., for treatment of veterans in that area. The site has not yet been selected, although it is desirable that the general medical and surgical activities of the V. A. in the city be located as close as possible to Emory University Medical School in order to insure the active cooperation of medical personnel as consultants and residents.

Occupational Therapy

Mrs. Winifred Kahmann, Indianapolis, director of occupational and physical therapy at the Indiana University Medical Center, has been elected president of the American Occupational Therapy Association.

Miss Sue Hurt, field secretary of the American Occupational Therapy Association and for several years director of the department of occupational therapy of the Richmond Professional Institute of the College of William and Mary, Richmond, Va., has been appointed director of the department of occupational therapy, Washington University School of Medicine, St. Louis.

New Appointments

National Foundation for Infantile Paralysis

Dr. Harry M. Weaver, acting director of research for the National Foundation for Infantile Paralysis has been named director of research for the organization.

Previously on the faculty of Wayne University College of Medicine, Detroit, Dr. Weaver joined the National Foundation staff last February as assistant to the medical director.

Dr. Weaver will be responsible for the research program of the National Foundation through which grants are made to established research organizations such as universities, public health laboratories, hospitals, etc., to enable scientific investigators throughout the country to carry on programs of research designed to find ways to prevent or cure poliomyelitis.

Clair E. Turner, Dr.P.H., visiting professor of health education, University of California, and consultant to the Illinois Department of Public Health and the Kansas State Board of Health, has been appointed assistant to Mr. Basil O'Connor, president of the National Foundation for Infantile Paralysis. Dr. Turner will be engaged in strengthening relationships between the school systems and the various activities of the national foundation.

Medical Department Films Available to Medical Schools

Under a plan recently approved by the War Department, professional medical motion picture films produced for use by The Surgeon General are now available for loan to medical schools, medical societies, and individual physicians. Be-

cause of the legal restrictions imposed on most of these films, loans will be made only on approval of The Surgeon General's Office and only for nonprofit showing to groups who are bound by the ethics of the medical profession. Borrowers are required to sign an agreement to abide by the conditions of loan.

A list of the films that may be of particular interest to Physical Therapists follows. All prints are 16 mm. Copies of the application form for loan of prints may be secured by writing the Surgeon General, Attention: Chief, Education and Training Service, The Pentagon, Washington 25, D. C.

TF 8-2070 Reconditioning Convalescents for Return to Duty. B & W. Sound. 37 minutes.

Presents the scope, significance, and operation of the reconditioning program in Army hospitals.

TF 8-2083 Swinging Into Step. B & W. Sound. 33 minutes.

Rehabilitation and morale film for amputees, showing graphically, how loss of limbs does not mean the patient cannot return to normal living.

Misc. 956 Meet McGonegal. B & W. Sound. 12 minutes.

Picturization of a well known amputee, now a successful business executive, designed to show how well a man with two artificial arms can get along.

Misc. 1081 Reconditioning in the Eto. B & W. Sound. 29 minutes.

Covers the phases of physical and occupational reconditioning as practiced in the ETO.

Misc. 1129 Diary of a Sergeant. B & W. Sound. 21 minutes.

Designed for patients who have lost a limb. The purpose is to show them how one soldier in a serious situation was able to regain his place in normal happy living.

Misc. 1173 The Army Nurse. B & W. Sound. 15 minutes.

The film explains the duties and activities of the Army Nurse Corps.

Misc. 1254 Half a Chance. B & W. Sound. 11 minutes.

Morale film for amputees showing how one amputee through the use of an artificial leg was able to participate in various sports including professional baseball.

Misc. 1233 Neurosurgery in an Overseas General Hospital. Color. Sound. 47 minutes.

A record of typical neurosurgical problems encountered in overseas specialty centers. It is a film of primary interest to professional individuals, since it presents the various technical phases required for acceptable diagnosis, treatment and postoperative care.

Misc. 1234 Convalescent Care and Rehabilitation of Patients With Injury to Spinal Cord. Color. Sound. 41 minutes.

Approved diagnostic, surgical, nursing, and

physical medicine technic and practices pertinent to the care and rehabilitation of paraplegic patients are pictured.

Misc. 1236 Thoracic Surgery, Part I—Hemothorax With a Consideration of Specific Remedial Breathing Exercises. Color. Sound. 40 minutes.

A presentation of the pathologic, diagnostic, and therapeutic aspects of hemothorax and other disorders of the pleura and the pleural cavity.

Misc. 1249 The Sky Is the Limit. Color. Sound. 20 minutes.

A picture of the phases of rehabilitation that apply to an above-knee amputee. It portrays the proper walking technic for individuals with two normal lower extremities and for a unilateral AK amputee and it emphasizes many of the capabilities which are within the reach of the patient who possesses the will to strive for them.

National Society for Medical Research

Research on animals for the development of life-saving medical knowledge has been endorsed by the Chamber of Commerce of the United States in a statement of policy released recently by Howard Strong, Secretary of the Health Advisory Council of the Chamber of Commerce.

Mr. Strong announced the policy as the result of a referendum vote of member organizations. The statement submitted for the vote is as follows:

"In view of the great progress that has been made in preventive and curative medicine and surgery through animal research and the prospect of even greater progress in the future, the National Chamber is unalterably opposed to the prohibition of this scientific procedure. Such a prohibition would seriously hamper all medical progress."

Result of the vote was: 2424 organizations in favor of the statement, 18 against. Represented in the poll were slightly over a million business men.

Mr. Strong, in a letter to Dr. A. J. Carlson, president of the National Society for Medical Research, announced the outcome of the Chamber of Commerce referendum and said, "We are therefore now in a position to present the Chamber's opposition to any anti-vivisection legislation wherever such legislation rears its head and when advisable and possible, a representative of the Chamber can appear in opposition."

Honorary Consultants to Army Medical Library Meet in Washington

The Association of Honorary Consultants to the Army Medical Library held its third annual meeting in Washington, October 4 and 5.

Discussion of plans for a new library building, handling of the rare book collection and avoidance of duplication in federal libraries were included in the agenda.

Medical Rehabilitation Conference

"Reconditioning and rehabilitation of patients eventually will be adopted by all progressive civilian hospitals," predicted Dr. Constantine G. Psaki, chief, physical medicine and medical rehabilitation division of Branch office No. 3, Veterans Administration, at the Medical Rehabilitation Conference and Installation of Service at the Veterans Administration Hospital, Lyons, N. J., Sept. 23 to Oct. 1, 1946.

"This form of integrated therapy was pioneered and accepted by the Armed Forces because it was proven to be the efficient and economical approach to the problem of hospitalization. The VA hospitals are the first civilian hospitals to adopt the program in full," said Dr. Psaki. "It means that fewer hospital beds will have to be provided because the hospitalization time of each patient is reduced. Also the incidence of complications and the number of readmissions is minimized."

"Medical Rehabilitation," said Dr. Psaki, "combines the professional services—medical and nursing—with dietetic, social, educational and vocational, special services and auxiliary services such as the Red Cross, to seek the restoration of healthy minds and bodies. This operation starts with the admission of the patient to the hospital."

Physical Medicine at Fitzsimons General Hospital

Brigadier General Omar H. Quade, Commanding General, Fitzsimons General Hospital, Denver, Colorado, announced on August 9, 1946, the establishment of a new Physical Medicine Service on a hospital level with the other professional services.

The new service, under the direction of Major John H. Kuitert, Medical Corps, combines Physical Therapy, Physical Reconditioning and Occupational Therapy. Certain shop and school activities with a dual educational and occupational function such as ceramics, photography, radio and typewriting will be coordinated through the Occupational Therapy Branch of the new service.

Discussion on Medical Application of Use of Atomic Energy

Among the subjects discussed by 2,000 members and guests of the District of Columbia Medical Society was the medical application of atomic energy, surgical progress in the war and advances in cancer treatment. Capt. George M. Lyon, chief medical officer of the Bikini atomic bomb tests, lectured on atomic energy and future health.

The Cutter Lecture on Preventive Medicine

Sir Lionel Whitby, regius professor of physics in the University of Cambridge, England, delivered the Cutter Lecture on Preventive Medicine, November 6, in Amphitheater D of Harvard Medical School, Boston. His subject was "The Hematological Effects of Irradiation." The lectures have been held since 1912.

Jacques Gray New Dean at Oklahoma

Dr. Jacques P. Gray, formerly dean, at the Medical College of Virginia, Richmond, began a similar appointment at the University at Oklahoma School of Medicine, Oklahoma City. He succeeds Dr. Wann Langston, who recently resigned from a temporary appointment following the death of Dr. Tom Lowry.

Lucius Johnson Joins College of Surgeons

Rear Admiral Lucius W. Johnson (MC), retired, Washington, D. C., is now affiliated with the American College of Surgeons, serving as field representative in the Pacific Coast area, where he is conducting hospital standardization and graduate training in surgery surveys. Dr. Johnson, who received a D.D.S. at the University of Pennsylvania School of Medicine, Philadelphia, in 1903 and an M.D. in 1907, entered the navy in 1908.

Work of Commission on Hospital Care Continued

The American Hospital Association, Chicago, has announced the establishment of a department within the association for the purpose of continuing certain of the functions initiated by the Commission on Hospital Care after the commission disbanded on October 1. In cooperation with the U. S. Public Health Service the association will continue to code and tabulate hospital schedules for state survey commissions through the Chicago office of the American Hospital Association.

Appointments to Board for Physical Therapy Technicians

Governor Raymond E. Baldwin of Connecticut has appointed Dr. George G. Fox, Meriden, to be a member for five years of the State Board of Examiners for Physiotherapy Technicians, succeeding Dr. Frank S. Jones, Hartford. Other appointments to the board include Dr. Edward H. Crosby, Hartford, to fill the vacancy caused by resignation of Dr. Carl J. Gade, Bridgeport, term to expire July 1, 1949. Dr. Denis S. O'Connor, New Haven, was appointed to fill the vacancy caused by the resignation of Dr. Berkley M. Parmelee, Bridgeport, term to expire July 1, 1948.

Brigadier General Joseph E. Bastion, Percy Jones Hospital Commander, Decorated by the Surgeon General

Major General Norman T. Kirk, The Surgeon General, presented Brigadier General Joseph E. Bastion, Commanding General of Percy Jones General Hospital, with the Distinguished Service Medal at Fort Custer, Michigan, on October 11.

Major General Shelly U. Marietta, U. S. A. (Retired), is the only other hospital commander to re-

ceive the D. S. M. in the history of the Army. He was formerly Commanding Officer, Walter Reed General Hospital, Washington, D. C.

In September, General Bastion was presented the Legion of Merit by Major General Louis A. Craig, Deputy Commanding Officer of the 5th Army in the Civic Opera Building, Chicago. That citation commended General Bastion for his outstanding service as Surgeon of 6th Corps and 6th Service Command from December, 1941, to May, 1943.

The citation accompanying the Distinguished Service Medal praised General Bastion's "exceptionally meritorious and distinguished service from May, 1943, to June, 1946." It also cited his outstanding service as an administrator and for the high degree of medical care provided patients under his command. "General Bastion . . . contributed materially to the success of an important phase of the war effort."

Major Harry T. Zankel

The Commendation Ribbon was recently awarded to Major Harry T. Zankel of Brooklyn. The citation read, in part, "Your service with the Medical Department when compared with others of the same grade of similar position has been exceptional, and I wish to commend you for your outstanding contribution as chief of physical therapy and occupational therapy sections, LaGarde General Hospital, New Orleans, from July, 1944 to September, 1945." Dr. Zankel, a member of the Congress, graduated from Long Island College of Medicine, Brooklyn, in 1925 and since his release from the service he has become chief of physical medicine and medical rehabilitation at Crile Veterans General Hospital, Cleveland.

Speech and Hearing Program

A new educational, research and clinical program in speech and hearing rehabilitation has been inaugurated by the University of Illinois College of Medicine. Herbert Koepf-Baker, Ph.D., recently released from the navy and formerly director of the Speech and Hearing Clinic at Pennsylvania State College, will serve as director. Dr. Koepf-Baker's appointment, said to be the first of its kind in any major university, will immediately provide instruction and clinical experience in this highly specialized field for medical students, physicians and persons working in the closely correlated nonmedical branches of special education, psychology and social work. In the nonmedical field professional speech therapists will be trained in the correction of defective hearing and speech.

Survey of Handicapped Children

A survey of the needs of handicapped children attending city schools to determine whether a physical therapy program should be established by the board of education is now under way, the New York Times reported. The study is under the direction of Dr. Frank J. O'Brien, associate superintendent of schools in charge of the division of child welfare.

Society for Surgery of the Hand

The American Society for Surgery of the Hand will meet in Chicago, January 24-25, under the presidency of Dr. Sterling Bunnell, San Francisco. The society was formed in January, 1946, as a direct outgrowth of the interest which developed in surgery of the hand during World War II. The original group consisted of thirty-five surgeons, all of whom are primarily interested in surgery of the hand or who have contributed to the development of this field of surgery. The organization is limited in membership, is invitational and has as its objective improvement and development of surgery of the hand. Dr. Summer L. S. Koch, Chicago, is president-elect; Dr. Henry C. Marble, Boston, vice-president; Dr. Joseph H. Boyes, Los Angeles, secretary-treasurer and Dr. Thomas W. Stevenson, Salt Lake City, historian.

Group Formed to Combat Multiple Sclerosis

The Association for Advancement of Research on Multiple Sclerosis has been organized. It is located in the New York Academy of Medicine Building, Fifth Avenue and 103d Street, New York, and was initiated by a group of multiple sclerosis patients together with friends and relatives in cooperation with some of the country's leading neurologists. The objectives of the new organization are to:

Coordination research efforts on multiple sclerosis in this country and abroad.

Gather statistics on its prevalence and geographic distribution.

Act as a clearing house for information on this disease. Educate the public on the problem of multiple sclerosis.

Collect funds to stimulate and support research on multiple sclerosis and allied diseases.

It is planned to conduct a nationwide membership drive. The organization consists of a board of sponsors and a medical advisory board. Dr. Tracy, L. Putnam, New York, is the honorary chairman.

School for Children With Spastic Paralysis

By private initiative arrangements are being made to establish a school in London, at Croydon. The advisory medical staff will include a neurologist-pediatrician, an orthopedic surgeon and a specialist in physical medicine, all of whom will also be on the staff of the Carlshaltion Hospital. The two physical therapists of the school have completed a course of training at the clinic of Dr. Phelps in Baltimore, and the education psychologist has studied the work of a large number of American clinics.

Obituary

We regret to announce the passing of two of our Congress members, Dr. Nathan A. Monroe of Syracuse, N. Y., and Dr. Paul Roth of Battle Creek, Michigan.

BOOK REVIEWS

MANSON'S TROPICAL DISEASES. A MANUAL OF THE DISEASES OF WARM CLIMATES. Edited by Philip H. Manson-Bahr, C.M.G., D.S.O., M.A., M.D., D.T.M. and H. Cantab., F.R.C.P., London. Senior Physician to the Hospital for Tropical Diseases, London; the Albert Dock Hospital and the Tilbury Hospital; Consulting Physician to the Colonial Office and Crown Agents for the Colonies; Consultant in Tropical Diseases to the Admiralty and the Royal Air Force; Director, Division of Clinical Medicine, London School of Hygiene and Tropical Medicine; Lecturer on Tropical Medicine to the London Hospital; Corresponding Member of the Société de Pathologie Exotique; Member of the Washington Academy of Medicine; late Examiner in Tropical Medicine to the Conjoint Board of the Royal College of Physicians and the Royal College of Surgeons, England, and to Cambridge and Hongkong Universities. Twelfth Edition. Cloth. Price, \$12.00. Pp. 1068, with 17 color plates, 9 half tone plates, 406 illustrations. Baltimore: A William Wood Book. The Williams & Wilkens Co., 1945.

Probably every English physician for the past several decades, on his trip to the tropics, has carried a copy of this book with a feeling of comfort and security, that is if he did not worry too much about the possible disorders that he might secure. It covers every disease found in the tropical areas of the British Empire as well as sections on poisons, protozoology and laboratory techniques for these particular diseases. An introductory chapter on "Life in the Tropics" is instructive in that such items are discussed as disorders which contraindicate a trip to or stay in the tropics, "Principles for Increasing Bodily Comforts," even alcohol which is permitted as a "sundowner," "for taken with the evening meal promotes good fellowship," diets, acclimatization, etc. This is a complete and up-to-date work on this subject which will appeal more to a British physician than to an American since the terminology, medications and treatments are exclusively British. Fault can be found in that there is no bibliography and the illustrations in most instances are too small and indistinct.

NEUROSIS AND THE MENTAL HEALTH SERVICES. By C. P. Blacker, M.A., M.D., F.R.C.P. With a foreword by Sir Wilson Jameson, K.C.B., M.A., M.D., LL.D., F.R.C.P., Chief Medical Officer of The Ministry of Health and The Ministry of Education. Fabrikoid. Price, \$5.00. Pp. 218. London, New York, Toronto: Oxford University Press, 1946.

This book summarizes the results of questionnaires answered by the psychiatric clinics throughout England. It deals with their experiences dur-

ing the war, summarizes the present situation and suggests methods for handling many of these problems in the future.

It is not generally recognized in the medical profession even today how enormously important these problems are. This book should be widely read because of the clear way in which the fundamental problems are presented. When one realizes that a very large proportion of the crime and disease prevalent today could be prevented, with methods at present well known in limited circles and at a cost negligible in comparison to that resulting from crime and disease, it is appalling that so little has been done.

There is also a thorough discussion of the way in which auxiliary services (psychologists, social workers and occupational therapists) may be best integrated into the work. An interesting sidelight is the material devoted to the problem of how a social security system such as that in Socialist Britain may function and yet avoid becoming the victim of the group of malingerers.

AESCALAPIUS IN LATIN AMERICA. By Aristides A. Moll, Ph.D., Secretary-Editor, Pan American Sanitary Bureau, Washington, D. C. Consultant in Tropical Medicine to the Secretary of War; Honorary Professor of the Port-au-Prince Medical School. Cloth. Pp. 639, illustrated. Price, \$7.00. Philadelphia: W. B. Saunders Company, 1944.

America did not breed its Indian races. Conjecturally, Mongoloid nomads between one hundred and one hundred and fifty centuries B. C. or perhaps much earlier in the quaternary period, migrated or drifted into Northern America most likely from Siberia through the Bering Sea and more improbably across wider expanses of the Pacific and made their cautious way southward and to a lesser degree eastward. Latin America is vast and diverse, and aside from origin and the bonds forged by language and traditions, its various parts stretched across an immense continent have little in common. The teeming Argentine with its immense wealth and almost solid white population in the temperature zone is entirely different from tropical countries struggling under the disadvantages of a torrid clime, a sparse mixed backward population, almost undeveloped sources of prosperity and perhaps bending under the scourge of war.

This history gives an excellent birds' eye view of the whole situation. The magnitude of the field may be judged by comparing Flores' three quarto volumes on Mexican and Canton's six on Argentine medicine. Thick tomes have been written on special periods or phases of the medical

history of Brazil, Chile, Cuba, Ecuador, Guatemala, Mexico, Peru, Uruguay and Venezuela.

In the chapter on "The Indian Treasurer House" it is pointed out that the American natives were familiar with the uses of many physical agents as massage. Mineral springs were in much favor especially in the Inca empire. There are several interesting illustrations on native steam bath houses in Mexico. In a later chapter on the "Close of an Epoch" John Filipe Flores (1751-1814) is mentioned as the last man to graduate (1773) from the University of Old Guatemala City and who stressed anatomy and physics as the basis of medicine. It also notes that he was among the first to study electricity scientifically, even anteceding Galvani. In a chapter on "Laboratories and Institutes" it is noted that an Institute of Radiology and Physiotherapy was created in 1925 in Buenos Aires as a dependency of the city Department of Health and Welfare. It provides diagnostic and treatment services as well as training.

PHYSICAL CHEMISTRY FOR PREMEDICAL STUDENTS. By *John Page Amsden*, Professor of Chemistry, Dartmouth College. Cloth. Price, \$3.50. Pp. 298, with 53 illustrations. New York and London: McGraw-Hill Book Co., Inc., 1946.

Physical chemistry is more and more gaining in importance as a prerequisite for medical students. For the study of many subjects in physiology such as nerve and muscle it has become essential. As the author mentions in his preface a compromise is indicated between the need for teaching of physical chemistry and the already overcrowded premedical curriculum. The author has given what might be considered a minimum for an adequate understanding of physiologic processes on a physical-chemical basis. It seems to this reviewer that a more extensive discussion of membrane potentials and semipermeable membranes in general and a more elaborate discussion of surface phenomena might be considered for a second edition. The author has tried to avoid higher mathematics as much as possible, and this leads to some strange situations. In a footnote on page 186 the author explains the difference between common and natural logarithms, used in an equation that requires integration. It would seem that a student who is able to understand this equation might be expected to know the difference between common and natural logarithms. Some of the author's statements on physiologic processes suffer from too much simplification and could in a new edition be omitted. The use of the word hydronium ion in the chapter on the H ion is hardly an improvement.

The writing of a text like this is obviously a compromise between what can be included without making the book too long and what one might want to include because of its importance as a basis for physiologic work. It is this reviewer's opinion that the author has been fortunate in his selection. A course based on a book like this should be included in the premedical curriculum and it should certainly

be a minimum requirement for specialists in physical medicine. The teaching of electrotherapy to physical therapy technicians would be made much easier if these students were familiar with the contents of this book. All in all the author has written a book that's just short enough to make its study possible for the premedical students and just long enough to give him a much needed knowledge of the fundamentals of physical chemistry.

MEDICAL JURISPRUDENCE. By *W. F. Rhodes*, B.A., M.B., Ch.B., Government Pathologist, Union Health Department, Cape Town, *I. Gordon*, M.B., Ch. B., Senior Assistant Government Pathologist, Union Health Department, Cape Town, and *R. Turner*, M.B., Ch.B., D.P.H., Special Serologist, Union Health Department, Cape Town. With additional contributions by Prof. M. R. Drennan and others. Foreword by The Hon. Mr. Justice H. S. Van Zijl. Second edition. Cloth. Price, 32s. 6d Pp. 512, with 77 illustrations. Cape Town: Published for The Post-Graduate Press by the Stewart Printing Co. (Pty.) Ltd., 1945.

While this book is primarily written for conditions in South Africa it has much worth while material for American readers. A large part of the book is devoted to medical examinations needed in legal cases and only small sections are devoted to actual aspects. It is a well written and useful book.

TABER'S CYCLOPEDIC MEDICAL DICTIONARY — Including a Digest of Medical Subjects: Medicine, Surgery, Nursing, Dietetics and Physical Therapy. By *Clarence Wilbur Taber*, Author, Taber's Dictionary for Nurses, Taber's Condensed Medical Dictionary, Dictionary of Food and Nutrition, Dictionary of Gynecology and Obstetrics, etc., and Associates. Fourth Edition. Leather. Price, \$3.50 with Index; Plain, \$3.25. Pp. 1496 with 278 illustrations. Philadelphia: F. A. Davis Company, Publishers, 1946.

Taber's Cyclopedic Medical Dictionary contains nearly 1500 pages. It is composed of a double column page and contains between 50,000 and 60,000 words. The paper in the dictionary is light and of good, durable quality and the binding is of a soft, flexible leather. It is of a handy size.

The page numbers are not consecutive throughout the book, as each letter of the alphabet has its own page numbers. According to the author, this is done to make possible subsequent additions without changing all the page numbers.

Following definitions of diseases, symptoms, prognosis and treatment are generally given. When there are synonyms for a term, they are incorporated following the definition of the word. The subtopics are listed alphabetically in separate paragraphs under the word defined, making reference easy and quick.

The dictionary is well illustrated. The Appendix gives the units of measure, some anatomy and physiology, muscles, arteries, veins and nerves, which are all placed in the tables in the Appendix. This seems to be a definite advantage over such tables being placed

in the contents of the dictionary, as it eliminates leafing over a number of pages to look for the next word. It also contains a glossary of Latin and Greek medical words.

Mr. Taber's experience has been that of a medical consultant and editor to physicians in the writing and preparation of medical books, and he has been managing editor of a series of English Dictionaries. The Associate Editorial Staff includes twelve well-known physicians specializing in the various medical fields, a pharmacist and an instructor of nurses.

It appears to be a handy dictionary and reference book, which can be conveniently handled.

RELIEF AND SOCIAL SECURITY. By *Lewis Meriam*. Cloth. Price, \$5.00. Pp. 912. Washington, D. C.: The Brookings Institute, 1946.

This book consists of three parts. Part I deals with American relief and social security programs. Part II discusses British efforts for universal coverage, comprehensiveness and coordination. Part III discusses major issues today. The book contains a wealth of information on social security and relief problems. It describes the many pitfalls, politically and otherwise of the social security field and offers suggestions for improvement and development.

THE REHABILITATION OF THE INJURED—OCCUPATIONAL THERAPY. By *John H. C. Colson*, Member of the Chartered Society of Physiotherapy and of the Association of Occupational Therapists; Technical Director of Rehabilitation, Accident Service, Royal Sheffield Infirmary and Hospital. Formerly Rehabilitation Officer, Pinder Fields Emergency Hospital. S sometime Superintendent, Miners' Rehabilitation Center, Berry Hill Hall. Member of the Council of the Chartered Society of Physiotherapy. Member of the Joint Advisory Committee on Rehabilitation of the Chartered Society of Physiotherapy, the Ling Physical Education Association and the Association of Occupational Therapists. Foreword by E. A. Nicoll, M.D., B. Ch., F.R.C.S. Ed. Cloth. Price, \$5.00. Pp. 296, with 196 illustrations. Cassell & Co., Ltd., London, Toronto, Melbourne and Sydney. Pittsburgh, Pa.: British Publications Co., International Book Co., 1944.

This comprehensive and timely manual on occupational therapy is the first of a proposed series of textbooks by the author on the general heading of the Rehabilitation of the Injured. After physical therapy or in suitable combination with it, occupational therapy is the most important procedure in the after-treatment of trauma. The author has had wide experience in industrial rehabilitation in England and has developed his material with due regard to the medical man who wishes to familiarize himself with the principles of occupational therapy and the technician who is primarily concerned with the application of these principles. Thus each chapter which deals

with occupational therapy has been divided into sections on remedial use, craft technics and constructional work. The nine successive parts of the volume are: The Theory of Specific or Remedial Occupational Therapy; The Theory of Non-Specific or Diversional Occupational Therapy; Resettlement in Employment; Handicrafts; Industrial Productive Work; Woodwork; Gardening; Domestic Work; Timber Work. All chapters are amply illustrated and there are excellent tables regarding specific remedial movements and classification of crafts. This book fills a real need in presenting in an orderly and scientific manner the important role of occupational therapy for the restoration of function as part of a well integrated scheme of rehabilitation.

PROFESSIONAL ADJUSTMENTS IN NURSING. By *Eugenia Kennedy-Spaulding*, R.N., M.A. Coordinator of Staff Education, Office of Nursing, U. S. Public Health Service, Federal Security Agency. Third Edition. Cloth. Price, \$3.50. Pp. 509, with 32 illustrations. Philadelphia: London and Montreal: J. B. Lippincott Company, 1946.

This volume has been prepared as a text for senior nursing students and as a reference work for graduate nurses in the field of professional adjustments. The wealth of material is well organized and lucidly presented. The volume is divided into an introduction and four units.

The introduction, which contains 55 pages, describes the technic of solving personal and professional problems by logical reasoning and the use of the library. Unit one takes up the social and economic aspects of nursing: such things as the influence on the nursing profession of the world wars, political changes and the work of various nursing organizations. It also discusses the qualifications of the nurse. Unit two presents a survey of occupational opportunities for nurses in hospitals, nursing schools, private practice, physicians' offices, the army, the navy, the public health service, etc. This section should be of much value to the nurse in making an intelligent choice of her particular field of endeavor. Unit three describes the organization and activities of such professional groups as the alumnae associations, the American Nurses' Association, the National League for Nursing Education, the National Organization for Public Health Nursing and the American Red Cross. Nursing legislation and public relations in nursing are lucidly discussed. Unit four contains such miscellaneous subjects as legal aspects of nursing, economic security, professional relationships and personal growth.

Each unit in the volume is divided into several smaller numbered sections. At the end of each of these smaller divisions is a list of problems and an extensive bibliography. Although the reviewer is not a nurse, he is much impressed with the value of this work to the student or the graduate nurse.

PHYSICAL MEDICINE ABSTRACTS

Treatment and the Results of Treatment in Anterior Poliomyelitis. Shelby G. Gamble.

Ohio State M. J. 42:831 (Aug.) 1946.

It is realized that there are many manners and means of treating anterior poliomyelitis. Since this condition is generally accepted as being a virus disease, it must be understood that to date there is no specific therapy known, drug or otherwise, that destroys the virus or controls its spread within the body. In other words, one cannot prevent the development of, or lessen the severity of, paralysis in a patient by any means known at present.

The convalescent stage is primarily one of good physical therapy. The object of treatment for patients with definite residual paralysis is to keep the joints limber, keep the muscles in good general condition as far as possible while waiting until the innervation returns—if this is to occur—and to prevent deformities and contractures. This is not always possible with the best of care, as occasionally deformities are progressive no matter what is tried. However, the general statements made are true in the average case, as most patients show varying degrees of improvement over the original weakness or paralysis; provided, of course, as previously stated that the motor cell is not completely destroyed.

The paralysis and weakness in poliomyelitis are spotty, which is typical of the involvement. By nature of this irregular involvement, changes will occur at irregular intervals; hence no set routine can be followed. Instead, patients must be examined and observed frequently.

The convalescent period is one of rest, of passive, assistive and active exercise both in and out of water, of muscle reeducation, and of avoidance of muscle substitutes. It is one of gradual ambulation and increased activity as indicated. Braces, corsets, crutches and other mechanical aids may or may not be indicated, depending upon the individual case. Such apparatus, when necessary, is always obtained through conference with and ordered by the orthopedic surgeon in attendance on the case. A certain amount of muscle power is essential to perform certain tasks or use certain apparatus. However, in general, muscle balance and coordination are of prime importance—not strength. Reeducation of muscles requires a great deal of patience and perseverance on the part of the patient, the family and all persons related to the treatment program. Even though muscles may appear normal early in the program, there is not the normal reserve present; consequently, fatigue is an important factor to be avoided.

The results of treatment, of course, depend upon the degree of weakness or paralysis that is present. As stated before, there is no specific agent yet

known that will lessen the degree of paralysis that a patient may have from the infection. Basically, everything depends on the degree of involvement of the anterior motor horn cells. Much can be done, however, to keep muscles and joints in good condition and prevent deformity while waiting the return of function of the motor cell. If this occurs completely, the period of care is then significantly shortened. If the return of function is only partial, a varying amount of help can be given, so that the patient may be able to use whatever apparatus is necessary or, on the other hand, be in good general, as well as local, condition as a preparatory measure to corrective orthopedic surgery. As a broad statement, treatment programs today leave a patient in a far better general over-all condition than did those of some years back. The results today show the effect of scientific physical therapy and judicious orthopedic surgery when a patient can be controlled and treated properly, treatment including adequate follow-up. Last but not least in consideration of results is an intelligent patient with a will to improve, a cooperative family and means of social and economic rehabilitation, so that a patient has something to look forward to.

Stimulation of the Central Nervous System by Curare (Intocostrin). Rosellen E. Cohnberg.

J. Lab. & Clin. Med. 31:866 (Aug.) 1946.

Intocostrin, or crystalline d-tubocurarine chloride, injected in sufficient dosage subcutaneously, intramuscularly, intraperitoneally or intravenously into rats, mice, guinea pigs, rabbits and cats, produces hyperexcitability and colonic convulsions in addition to partial curarization.

Signs of central nervous stimulation are more conspicuous in some species than in others and are shown by rats without signs of asphyxia. Species manifesting much stimulation (rats, guinea pigs, mice), are killed by smaller doses of the drug than species manifesting more curarization (rabbits, cats).

With fatal doses, death in all these animals is due to asphyxia, attributed in part to curarization of respiratory neuromuscular junctions peripherally and in part to stimulation centrally. The asphyxia may be relieved by neostigmine (peripheral action) or by sodium amytal (central action). Sodium amytal protects 60 per cent of rats from the effects of a dose of intocostrin (2 units per kilogram) fatal to 95 per cent of untreated rats. The other 40 per cent of rats given sodium amytal prior to intocostrin live twice as long after the intocostrin injection as those not given sodium amytal.

Central nervous depressants (sodium amytal, cyclopropane), decrease, abolish or prevent intocostrin convulsions. Reduction of asphyxia by

oxygen administration or artificial respiration is less, if at all, effective in controlling convulsions.

Course and Rate of Regeneration of Motor Fibers Following Lesions of the Radial Nerve. Sydney Sunderland.

Arch. Neurol. & Psychiat. 56:133 (Aug.) 1946.

The object of this paper is to record and to discuss the significance of observations on the course and rate of regeneration of motor fibers following complete interruption of conduction in the radial nerve due to gunshot wounds, simple fractures of the humerus, penetrating injuries and lacerations. The results of an investigation of simple compression injuries of this nerve have previously been described by Sunderland.

Detailed observations on motor recovery have been reported by Stopford and by Seddon, Medawar and Smith.

In this investigation of a series of 63 lesions of the radial nerve particular attention was paid to the following points: (1) end results; (2) course of spontaneous regeneration and regeneration following suture; (3) pathologic features of the lesion, as deduced from a study of the course of regeneration; (4) selection of cases suitable for investigation of the rate of regeneration of peripheral nerves in man, and (5) rate of regeneration, which was estimated over different segments of the nerve in order to determine whether regeneration progresses at a uniform rate or otherwise.

A method for estimating rates of regeneration of functionally mature motor fibers in human peripheral nerves is described. With this method, rates of regeneration have been calculated over proximal and distal segments of the nerve below the origin of the branch to the brachioradialis. The results indicate that there is a progressive diminution in rate as regeneration advances.

In cases of axonotmesis mean rates of 1.9 and 0.8 mm. per day were obtained for the proximal and distal segments of the nerve, respectively. In cases of suture, mean rates of 1.2 and 0.6 mm. per day were obtained for the proximal and distal segments of the nerve, respectively.

Observations were made on the period intervening between the injury and the time when regenerating axons enter the distal segment—the initial delay—in cases of axonotmesis and suture.

(a) The duration of the initial delay is a measure of the degree of severity of the injury.

(b) The relationship of the duration of the initial delay to the reinnervation of the motor field subsequent to the onset of recovery is discussed in some detail. In general, initial delays of long duration are associated with longer periods for the reinnervation of the motor field. An early or a late onset of recovery is not, however, invariably followed by a subsequent accelerated or retarded rate of recovery.

(c) An initial delay of up to 10 weeks may be expected in cases of injuries which are maximal in degree and which are usually due to uncomplicated trauma. If the lesion is more severe, as it is after suture or after severe gunshot wounds associated with a fracture of the humerus, infec-

tion and intensive scarring, then a delay of approximately 4 months may be expected. It is, however, difficult to distinguish between simple and severe nerve lesions, since the nature and severity of the causative injury are by no means an invariable guide.

From a knowledge of the presumed initial delay, the level of the lesion and rate of regeneration, it is possible to ascertain when recovery, spontaneous or following suture, should be expected.

By adding 11 to 23 weeks, according to the type and severity of the nerve lesion, to the date of onset of recovery in the first muscle to be reinnervated, it is possible to calculate the approximate time when voluntary contraction may be expected in the last muscle to be reinnervated.

The maximal period intervening between the injury and the onset of recovery—latent period—before spontaneous regeneration became evident and proceeded to completion was 10 months. In the majority of nerves regenerating spontaneously, however, recovery had appeared at the end of 6 months.

Anterior Poliomyelitis. Robert O. Ritter.

J. Indiana M. A. 39:385 (Aug.) 1946.

Persons who are attacked by poliomyelitis are never cured; they recover, and what is done for them only assists in their recovery.

In the acute, febrile stages, which lasts only a few days, the treatment is symptomatic. Bed rest in a quiet, darkened room is indicated. Sedatives should be given for restlessness or for pain. Neostigmine and curare have been recommended for relief of muscle spasm and contracture. Convalescent serum in the pre-paralytic stage may be given if the parents demand it or if the physician wants to give it. Many believe it has no specific value.

The stage of tenderness and early contractures begins after the fever subsides and lasts from three to six weeks or longer. During this stage the affected extremities are kept in neutral position by splints or casts. These may be removed at intervals and passive motion given. Warm baths or hot packs may be used. Massage in this stage may increase pain and contractures and should not be used.

The convalescent stage begins when all tenderness is gone, and lasts from a few months to a few years. Muscle training, by passive and active motion, and underwater exercises may be used. The patient is allowed to be out of bed, and the affected muscles are protected by splints or braces. Muscle training is continued until no further improvement is shown.

The Kenny treatment is based on the theory that muscle spasm, muscle incoordination and mental alienation are the cardinal symptoms. Miss Kenny says that this spasm and pain must be relieved before the persistent muscle spasm causes paralysis or muscle weakness. The hot packs are of value in the acute stage as relief for pain and spasm. Miss Kenny uses continuous hot packs, passive motion and one or two active movements

twice a day until useful function is restored. She does not permit the use of splints or braces. To avoid any splinting effect, the joints are not included in the packs.

The Relationship Between Total Heat Exchange and Blood Flow in the Hand at Various Ambient Temperatures. R. E. Forster II; B. G. Ferris Jr., and R. Day.

Am. J. Physiol. 146:600 (July) 1946.

In the past, the temperature of the arterial blood entering the hands and feet has been assumed to be close to the deep body temperature under normal conditions. This assumption has constituted the basis for investigations of blood flow employing the calorimetric technic of Stewart. The possibility of arterial blood being cooled prior to its entry into the extremity, either by cooler tissues about the vessel or by returning cool venous blood in the neighboring vein has, however, been suggested. These present studies demonstrate this phenomenon in the hand at various ambient temperatures.

An air-filled combination plethysmograph and calorimeter was constructed to measure the blood flow in the hand and the heat loss by radiation, convection and evaporation. Measurements were made of blood flow and of heat loss with the entire body exposed to ambient temperatures of from 15 to 38 C. Hand blood flow rates as low as 0.15 cc. per hundred cubic centimeters of hand tissue were recorded after exposure of the body to the cold for several hours. The temperature drop in the blood as it passes through the hand can be calculated from the figures obtained. There seems to be considerable cooling of arterial blood before it enters the hand.

Physiotherapy in Rheumatic Diseases: The Choice of Suitable Methods at Various Stages. L. Schmidt.

Brit. J. Phys. Med. 9:104 (July-Aug.) 1946.

In the prescription of physical therapy for sciatica it is well to concentrate first on the treatment of the spastic muscles with histamine ion transfer. This has to be done, as a rule, in three stages. The dispersive (in this case, negative) electrode is best placed over the popliteal fossa and the active (positive) electrode first on the lumbosacral muscles, then on the gluteal muscles and finally on the peroneal region; when there is a distinct numbness of the feet and toes, a fourth stage should be added by placing the active electrode on the upper part of the foot.

As soon as the most acute pains have gone, histamine ion transfer should be replaced by iodine ion transfer, given in the same manner. It is of distinct importance when one is dealing with sciatica to use tincture of iodine—not sodium or potassium iodide—the ion transfer being applied directly to the skin; this produces far better results. Whether or not this is due to the fact that tincture of iodine acts also as a skin irritant is hard to say. On the other hand, it is a fact that certain "quick cures" of sciatica, performed mostly by quacks and surrounded with great secrecy, are

carried out by means of some powerful skin irritant which causes actual blistering. Needless to say, such forms of treatment are most dangerous, as they may easily lead to nephritis, which may make the patient ill for the rest of his life and often even bring about an early death. No curative agent should ever be used with such ultra-intensity as to cause serious harm to the trusting patient.

Heat, even in mild form, is badly tolerated—this is certainly so in the beginning—and it usually does not improve matters. In any case one has to be very careful with its application, as a certain anaesthesia of the skin is often present; thus burns may be produced easily.

Massage should be applied in the final stage only, in order to try to free the nerve from the adhesions between it and the nerve sheath, which are in most cases an inevitable consequence of the acute inflammation. These adhesions are to blame for the numbness which often prevails for a long time after the disease as a whole is considered to be more or less cured.

Tendon Transplantation in the Hand. Hans May. Surg., Gynec. & Obst. 83:631 (Nov. 1) 1946.

This is as important as the operation itself. The healing process of a tendon wound passes through two stages: the proliferative and the formative stage. The first stage lasts about two weeks. During this time the tendon stumps become united by a connective tissue callus. The latter is then gradually converted into tendon. Mason and Allen, who did considerable experimental work on this subject, came to the conclusion that function during the first phase did not accelerate the development of the tendon callus. On the contrary, function appeared to be harmful insofar as it caused more reaction of the surrounding tissue and weakening of the union. Later on after the first callus has formed, restricted use of the tendon caused but slight irritation with rapid increase in tensile strength of the union.

It is common belief among surgeons, that motion, if started early, will prevent the adhesion of tendons. However, the opposite seems to be the case. Early motion, restricted or unrestricted, favors adhesions. The latter are due not only to irritation of the surrounding tissue, but also to disturbance of the vascularization of the tendon. This is a factor which should be pointed out strongly. The bulk of the blood supply of a tendon outside its sheath is derived from the paratendon. It is only natural that a tendon operation causes some disturbance of the local circulation, since it is almost inevitable to leave the intimate connections of the paratenal and surrounding tissue undisturbed. This is particularly true in tendon grafting. If the involved tendon is adequately immobilized, the interrupted blood supply of the paratendon and tendon will become reestablished. Early motion may disturb vascularization leading to necrosis of the gliding mechanism and formation of adhesions. The author prefers the molded plaster cast splint to any other kind of splint. The hand is placed in such a position that the suture line is under a minimum of tension.

A Study of Nerve Degeneration and Regeneration.
Joseph Erlanger, and Gordon M. Schoepfle.
Am. J. Physiol. 147:550 (Nov. 1) 1946.

For the most part the preparation used has been the phrenic nerve with two of its roots of origin. One is crushed; the fibers of the other, remaining intact, serve as the control. Movable stimulating electrodes are applied to the nerve proper and fixed leads are taken from each of the roots separately. The results so obtained are expressed as ratios, degenerated over normal $\times 100$. Completing observations have been made in which all of the fibers of the phrenic are degenerating, the lead then being taken first from one end of the nerve, then from the other.

Degeneration is complete in four days over lengths that have exceeded 200 mm.

At three days the changes in the area of the action potentials are such as to indicate that at the shortest distances of conduction (30 to 40 mm. from the lesion) only about one-fourth of the degenerating fibers still conduct to the central lead; and there is a further decrease in action potential area as the distance of conduction increases. At this time half-maximal excitabilities and the conduction rates in the fastest fibers are normal in the proximal reaches but possibly decline slightly peripheralwards. The evidence indicates that the decline may not be real but merely the statistical result of a reduction in the total number of fibers conducting. Chronaxie also is normal.

The results are compatible with abrupt failures of conduction at random loci increasing in frequency peripheralwards, or possibly with failure proceeding centripetally. The histologic evidence is reviewed that would account for the premised type of failure.

Under repetitive stimulation at high rates the only differences observed in the behavior of normal and degenerating fibers is such as to indicate that the relatively refractory period of the latter may be prolonged somewhat. Not all of the preparations exhibit this difference.

The properties of regenerating fibers, likewise, have been studied by the ratio and other methods in the phrenic nerve preparation.

The excitability ratio at its lowest, twenty-nine to thirty-one days, declines with the distances from less than 5 to about 1, the normal being 100+. It becomes approximately uniform the length of the nerve at about 130 days, but continues to increase through 343 days, when it attains a value of about 45. At this time chronaxie is normal.

Conduction velocity in the earlier stages of regeneration falls off with the distance. At thirty-one days it ranges, depending on the distance, from 7.4 down to less than 0.8, while the normal rate under identical conditions is linear and 42 mps. The rate becomes linear in regenerating fibers after about 190 days, but at 343 days has attained only slightly more than 60 per cent of the normal.

The results indicate that conduction rate and excitability may never return to normal.

Area ratios indicate that by fifty days less than

half the central fibers have grown out to the peripheral end of the preparation (140 to 147 mm. from the lesion); that the number is approaching 100 per cent at about 100 days. The outgrowth is at the rate of over 4.83 mm. per day.

In the very early stages of regeneration conduction through the union may be more facile in the direction, regenerating to normal than contrariwise.

Treatment of Cerebral Palsy. **Frederic B. House,**
and Walter J. Zeiter.

Cleveland Clin. Quart. 13:213 (Oct.) 1946.

The patient is admitted to the center on the recommendation of any private physician or clinic, the diagnosis usually being made before the patient comes to the center.

At the end of a two-week period the case is again reviewed by the physiatrist in a conference with the therapists, psychologist and medical social worker. Orders are given for physical therapy, speech therapy and occupational therapy. This plan is flexible and may be revised at recheck examinations, which are made every six to eight weeks. Surgical procedures, splints, and braces are included in the general plan of treatment at this time.

Spasticity is a condition involving muscles, rendering them spastic, flaccid, weak, normal or tight. Thus, any treatment of this type of cerebral palsy must be based on a careful evaluation of the relative power of the muscles and their antagonist. Under the direction of a physical therapist the patient can then be taught to utilize to best advantage his new balance in power.

Athetosis presents the problem of involuntary motion. Muscle weakness in the athetoid type is thought to result from disuse or tension. Braces may enable the athetoid patient to control involuntary motion, but their use should be accompanied by intensive treatment in conscious relaxation by physical therapy.

Treatment of the ataxic type of cerebral palsy consists for the most part in training the patient to substitute conscious balance control for the automatic balance control which he has lost. The ataxic patient is dependent on visual sensations for orientation. The treatability of the various types of the disease depends upon intelligence of the patient, severity of the involvement, and associated defects such as speech, hearing and sight.

Recent interest in cerebral palsy has made the medical profession cognizant of the extent of the problems and the importance of modern methods of treatment. The importance of coordination of the various specialties and services concerned with the diagnosis and treatment has been emphasized. The physiatrist, due to his particular training and close association with other specialized fields and services, is in an advantageous position to coordinate treatment. The diagnosis and the importance of differentiation between spastic, athetoid, and ataxic types of cerebral palsy have been briefly discussed. A method of comprehensive planning and several fundamental technics of treatment have been outlined.

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JOURNALS ABSTRACTED IN THE PHYSICAL MEDICINE ABSTRACT SECTION — JANUARY - DECEMBER, 1946

Abstracts of important articles in the following journals have been made in the Physical Medicine Abstract Section of the ARCHIVES during the past year.



- American Heart Journal. St. Louis.
The American Journal of Digestive Diseases. Fort Wayne, Indiana. (Continuation of Am. J. Digest. Dis. & Nutrition.)
American Journal of Hygiene. Baltimore.
American Journal of the Medical Sciences. Philadelphia.
American Journal of Obstetrics and Gynecology. St. Louis.
American Journal of Ophthalmology. Cincinnati.
American Journal of Physiology. Baltimore.
The American Journal of Psychiatry. New York.
American Journal of Roentgenology and Radium Therapy. Springfield, Ill.
American Journal of Surgery. New York.
American Review of Soviet Medicine. New York.
American Review of Tuberculosis. New York.
Annals of Internal Medicine. Lancaster, Pa.
Annals of the Rheumatic Diseases. London. (Continuation of Rheumat. Dis.)
Annals of Surgery. Philadelphia.
Archives of Dermatology and Syphilology. Chicago.
Archives of Internal Medicine. Chicago.
Archives of Neurology and Psychiatry. Chicago.
Archives of Ophthalmology. Chicago.
Archives of Otolaryngology. Chicago.
Archives of Pathology. Chicago.
The British Journal of Ophthalmology. London.
British Journal of Physical Medicine and Industrial Hygiene. London.
British Journal of Surgery. London and Baltimore.
British Medical Journal. London.
Bulletin of the Johns Hopkins Hospital. Baltimore.
The Bulletin of the U. S. Army Medical Department, Carlisle Barracks, Pa.
Canadian Medical Association Journal. Montreal.
Cardiologia. Basel.
Cleveland Clinic Quarterly. Cleveland.
Clinical Journal. London.
Delaware State Medical Journal. Wilmington.
Guy's Hospital Gazette. London.
Hospital Management. Chicago.
Hospitals. Chicago.
Illinois Medical Journal. Chicago.
Industrial Medicine. Chicago.
Irish Journal of Medical Science. Dublin.
The Journal of the American Medical Association. Chicago.
Journal of Bone and Joint Surgery. Boston.
Journal of Experimental Medicine. New York.
Journal of General Physiology. New York.
Journal of the Indiana State Medical Association. Indianapolis.
Journal of the Iowa State Medical Society. Des Moines.
Journal of Laboratory and Clinical Medicine. St. Louis.
Journal Lancet.
Journal of Laryngology and Otology. New York.
Journal of Michigan State Medical Society. Lansing.
Journal of Nervous and Mental Disease. New York.
Journal of Obstetrics and Gynaecology of the British Empire. Manchester.
The Journal of Pediatrics. St. Louis.
Journal of Physiology. London.
Journal of the Royal Army Medical Corps. London.
Lancet. London and New York.
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Medical Annals of the District of Columbia. Washington, D. C.
Medical Record. New York.
Medical World. Philadelphia.
Modern Hospital. Chicago.
Modern Medicine. Battle Creek, Mich.
Nevropatologiya i psikiatriya. Moskva.
New England Journal of Medicine. Boston. (Continuation of Boston M. & S. J.)
New York State Journal of Medicine. New York.
Ohio State Medical Journal. Columbus.
Pennsylvania Medical Journal. Harrisburg.
Practitioner. London.
Proceedings of the Royal Society of Medicine. London.
Proceedings of the Staff Meetings of the Mayo Clinic. Rochester, Minn.
Rhode Island Medical Journal. Providence.
Southern Medical Journal. Birmingham.
Southern Medicine and Surgery. Charlotte, N. C.
Surgery, Gynecology and Obstetrics. Chicago.
United States Naval Medical Bulletin. Washington, D. C.
Virginia Medical Monthly. Richmond.
West Virginia Medical Journal. Charleston.





SUBJECT INDEX

This is an index to all the reading matter in the ARCHIVES, except the Medical News Department.

The letters used to explain in which department the matter indexed appears are as follows: "E," Editorial; "C," Correspondence; "ab," abstracts; the star (*) indicates an original article in the ARCHIVES.

This is a subject index and one should, therefore, look for the subject word, with the following exceptions: "Book Reviews" and "Deaths," are indexed under these titles at the end of the letters "B" and "D." The name of author, in brackets, follows the subject entry.

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A Poliomyelitis Program in a General Hospital. Josephine H. Buchanan, M.D., Assistant Professor, Physical Medicine, Medical College of Virginia, Richmond, Va.

The Effect of Thermal Shock on the Voluntary Neuromuscular Apparatus. Eben J. Carey, M.D., Dean and Professor of Anatomy, Marquette University School of Medicine, Milwaukee.

The Council on Physical Medicine. Howard A. Carter, M.E., Secretary, Council on Physical Medicine, American Medical Association, Chicago.

Measurement of Clinical Ultraviolet. Clifton B. Cosby, M.A., Assistant Professor of Biophysics, Baruch Center of Physical Medicine, Medical College of Virginia, Richmond, Va.

Physical Medicine and Rehabilitation in the Veterans Administration. Donald A. Covalt, M.D., Assistant Medical Director, Medical Rehabilitation and Physical Medicine, Veterans Administration, Washington, D. C.

The Evaluation of Disability and Rehabilitation Treatment of Paraplegics. George G. Deaver, M.D., Clinical Professor of Medicine, New York University Medical College; Medical Director, Institute Crippled and Disabled, New York, N. Y.

The Evaluation of Disability and Treatment in Hemiplegia. Harold Dinken, M.D., Assistant Professor of Medicine, University of Colorado School of Medicine; Director of Physical Medicine, Colorado General Hospital, Denver.

Reliability of the Single Effort Muscle Test. Ellen N. Duvall, Ph.D., Research Associate, Physical Medicine, and Sara Jane Houtz, B.S., Instructor, Physical Therapy, Baruch Center of Physical Medicine, Medical College of Virginia, Richmond, Va.

Physical Medicine in the Navy. Comdr. Harry S. Etter, (MC), U. S. N., Bureau of Medicine and Surgery, Navy Department, Washington, D. C.

Muscle Strength and the Weather. Ernst Fischer, M.D., Professor of Physiology, Baruch Center of Physical Medicine, Medical College of Virginia, Richmond, Va.

Crossed Learning. F. A. Hellebrandt, M.D., Professor, Physical Medicine and Acting Director; Sara J. Houtz, B.S., Instructor, Physical Therapy and Annie M. Parrish, M.S., Instructor, Physical Therapy, Baruch Center of Physical Medicine, Medical College of Virginia, Richmond, Va.

The Role of Circulatory Changes in the Effectiveness of Thermogenic Agents on Deep Tissues. Harry M. Hines, Ph.D., Professor and Head, Department of Physiology and William D. Paul, M.D., Assistant Professor of Medicine, Director Department Physical Medicine, State University of Iowa School of Medicine, Iowa City, Ia.

Results of Combined Fever and Insulin Treatment in Schizophrenia. William A. Horwitz, M.D., Associate in Psychiatry; Franz J. Kallmann, M.D., Associate in Psychiatry, and Nicholas Kopeloff, M.D., Assistant Professor of Bacteriology, Columbia University, College of Physicians and Surgeons, New York, N. Y.

Physical and Nervous Factors in Experimental Hypertension. Frederick J. Kottke, M.D., Baruch Research Fellow in Physical Medicine, Department of Physiology, University of Minnesota School of Medicine, Minneapolis.

AMERICAN CONGRESS OF PHYSICAL MEDICINE

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FRIDAY, FEBRUARY 14, 1947

TENTATIVE PROGRAM

The session will run from 10:00 to 12 and 1:00 to 5 P.M.
Luncheon may be secured on hospital grounds at personal expense.

Message of Welcome: COL. ROBERT M. HARDAWAY, MC., Commanding Officer,
Percy Jones General Hospital.

Orientation Talk: COL. A. E. WHITE, MC, Chief, Physical Medicine Service.

Overseas Activities, Physical Therapy Department, Army General Hospital.
WALTER M. SOLOMON, M.D., Western Reserve University, School of
Medicine, Cleveland, Ohio.

Title to Be Announced.

EARL C. ELKINS, M.D., Section Physical Medicine, Mayo Clinic, Rochester,
Minn.

Spinal Cord Injuries.

LOUIS B. NEWMAN, M.D., Physician in Charge, Medical Rehabilitation,
Chief, Physical Medicine Service, Veterans Administration Hospital, Hines,
Illinois.

Management of the Arthritic.

JOHN F. WYMAN, M.D., Director Physical Medicine, Sacred Heart Sani-
tarium, Milwaukee, Wisc.

Physical Reconditioning in Medicine.

BENJAMIN A. STRICKLAND, Jr., Lt. Col. MC, Director, Physical Medicine,
Consultant's Division, Office of The Surgeon General, United States Army.
and
CECIL W. MORGAN, Ph.D., Washington, D. C.

Physical Medicine and Medical Rehabilitation, in the Veterans Administration.

DONALD A. COVALT, M.D., Assistant Medical Director, Medical Rehabilita-
tion, Veterans Administration, Washington, D. C.

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MEETINGS OF INTEREST TO THOSE IN THE FIELD OF PHYSICAL MEDICINE

In these columns will be published information about meetings of interest to those in the field of physical medicine. New data should be sent promptly to the office of the Secretary, 2 E. 88th St., New York 28, N. Y.

Midwestern Section, American Congress of Physical Medicine, Percy Jones General Hospital, Battle Creek, Michigan, Friday, February 14, 1947. Max K. Newman, M.D., Secretary, 10 Peterboro St., Detroit 10, Mich. See announcement, elsewhere this issue.

New York Society of Physical Medicine; meeting on first Wednesday, from October to May, New York City; Dr. Madge C. L. McGuinness, 51 East 87th Street, New York 28, Secretary.

The Pennsylvania Academy of Physical Medicine; meetings at the Philadelphia County Medical Building, 21st and Spruce Streets. Dr. Harold Lefkoe, 601 Medical Arts Bldg., Philadelphia 2, Secretary.

Southern California Society of Physical Medicine; Secretary-Treasurer, Dr. Theodore Stonehill, 10730 Olympic Blvd., Los Angeles 25, Calif.

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